



Brain tumor in a pediatric patient with hydrocephalus: A case study

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ABSTRACT

This is a descriptive study, with a qualitative approach, of the case study type. The information contained in this chapter was obtained by reviewing the medical records, interviewing the patient and talking to medical and nursing professionals at the Hospital de Emergência e Trauma Dom Luiz Gonzaga Fernandes, located in Campina Grande, Paraíba. The patient L. S. F., female, 3 years old, born in Areial - PB, arrived at the Hospital presenting a convulsive crisis that lasted for 15 days, having a history of headache, vomiting, intermittent fever for more than 1 year. Upon admission, a CT scan of the head was performed, which showed an expansive lesion with signs of bleeding, with acute hydrocephalus. Upon hospitalization through the Systematization of Nursing Assistance (SAE), it was possible to diagnose her with anxiety, and for that, a prescription was made with the interventions of administering analgesics, observing vital signs and keeping the bed rails high, due to young age. Subsequently, after being assisted by the neurosurgeon, he concluded that the tumor was a Thalamo-Mesencephalic, requiring a surgical procedure, which subsequently was performed uneventfully. The patient's brain tumor was taken for biopsy, for the opinion, and whether it is benign or malignant, the child will start chemotherapy, radiotherapy and similar treatment. The case reported and publications raised bring to light the discussion of the role of nursing in a complex situation such as the diagnosis of a brain tumor accompanied by hydrocephalus. It also ratifies the importance of the multidisciplinary team in this service, in which medical, nursing, psychology and physiotherapy teams must “walk” together, aiming at the well-being of the patient and his family.

Keywords: Nursing, Brain Neoplasms, Assistance.

1 INTRODUCTION

Hydrocephalus represents a medical and social impasse. Given this, this anomaly happens through secondary interurrences, such as infections of the central nervous system (CNS), traumatic causes, cerebral hemorrhages or CNS malformations, brain tumors or even in an idiopathic way (RAMOS, 2018). In Brazil, this pathology affects one to three people per 1000 births, in addition, 60% affects newborns and 40% elderly people, and the male sex has more chances of development (MATHIAS; CAPRONI, 2019).

Regarding the symptomatology, the clinical signs are not always definitive, in newborns or young children full, protruding or tense fontanels are suspected, sudden increase in head circumference, if the separation of the coronal and sagittal sutures is palpable if the infant becomes irritable or lethargic and presents a loud cry, persistent vomiting or convulsive crises (UMPHRED, 2009). In older children and



adults, the symptoms are headache, vomiting, difficulty seeing, lethargy or excessive drowsiness. However, in normal pressure hydrocephalus, patients develop urinary incontinence, difficulty walking, and cognitive impairment, characterized by memory loss (MATHIAS; CAPRONI, 2019).

About brain tumors (CT), they are configured from the marked multiplication of the cells of the nervous system, in general, they can be classified into benign or malignant. Therefore, the benign ones are massive bodies of cells, which develop slowly, and resembles the original tissue, while the malignant one will present disordered cell growth and can invade underlying tissues and organs, the metastases (BARROS et. al., 2012). CT scans represent 5% of neoplasms, some of which are more aggressive and others have a high chance of cure. Generally, the indicated treatment is the surgical procedure, radiotherapy and chemotherapy alone or in combination (VERISSIMO and VALLE, 2006). It is noticeable that cognitive difficulties, visual-spatial perception, orientation in space and time, attention and execution functions, can happen in patients with brain tumor (GIOVAGNOLI, 2012).

Thus, nursing care with a holistic approach is essential, since, in several cases, the prognosis of the individual who presents these complications is empowered with sequelae. Therefore, including the family makes the process less hostile, and facilitates a more harmonious environment, in which the health professional is a subsidy to assist in specific care.

1.1 TUMOR INFANTILE HYDROCEPHALUS: CLINICAL ASPECTS, CHARACTERISTICS, CLASSIFICATION AND TREATMENT

Hydrocephalus in children can be acquired individually, congenitally, or by CNS injury. Medicine reports that there is a strong association with neural duct closure defects, as in myelomeningocele. The disease may have an etiology of manifestation of certain current or underlying pathologies, such as tumors, infections, intracranial and post-traumatic bleeding (FILHO et al., 2021).

Usually, hydrocephalus is classified as communicating or non-communicating. The latter is also classified as obstructive. The obstruction may be at the end of the cerebrospinal fluid system in the obstruction of arachnoid villi classified as communicating hydrocephalus, or in the course of this system classified as non-communicating. Tumor obstruction usually occurs in the lateral ventricle, third ventricle, or fourth ventricle. In children, brain tumors cause non-communicating hydrocephalus type that according to the literature 2/3 of the primary brain tumors may arise from the posterior cranial fossa or the midline of the skull, thus increasing the chance of obstruction or difficulty in draining L=cerebrospinal fluid (CSF) (ZEBIANet al., 2017).

Regardless of classification or etiology, hydrocephalus and its associated diseases, such as brain tumors, have serious consequences for children. In the diagnosis of ICH (intracranial hydrocephalus), the warning signs and symptoms also vary depending on the age group. For the newborn, irritability, wide and



tense anterior fontanel, lethargy, vomiting or abnormally rapid growth of the skullcap are observed, all of these are serious findings. The fontanelles, until their closure in the first year of life, are of great importance for clinical evaluation. After the second year of life, the younger child presents more clearly hydrocephalus and intracranial tension. In the acute form, a deterioration of symptoms is observed rapidly and progressively, with the presence of headaches, vomiting, oculomotor symptoms, deterioration of the level of consciousness, convulsions and edema of the papilla, all are signs of intracranial hypertension. This acute form occurs in children with a new diagnosis of hydrocephalus without previous treatment, in children dependent on ventricular shunt, or in children with posterior fossa tumors. In the last example mentioned, the picture of obstructive hydrocephalus with ICH may be the first manifestation of the tumor itself. These findings can also be insidious, subacutely (FILHO et al., 2021).

The other form is chronic, patients may have occasional headaches that slowly and progressively become more frequent and intense. Finally, the clinician should be aware of other warning signs, such as occasional vomiting, progressive deterioration of gait, behavioral changes or localizing signs of intracerebral disease (VINCHONet al., 2016).

In the case of non-emergency situations, for the differential diagnosis of secondary hydrocephalus of a severe intracerebral pathology, the most common symptom of the pediatric clinic is headache. The indication of neuroimaging is justified by the exclusion of important diagnoses such as meningitis, hemorrhages and brain tumors. The sequencing of warning signs of adult headache is based on the SNOOP mnemonic (systemicdisease, systemic disease; neurologicsymptoms, neurological symptoms; onset, onset; onset; occipital; and pattern, pattern). Adapting to pediatrics, abnormal findings on neurological examination, atypical presentation of headache, dizziness, intractable vomiting, sudden awakening with headache, worsening of pain, all these are important points for deep investigation. Given this, the semiotics of pediatrics is still challenging. (TROFIMOVAet al., 2018)

Therefore, in the study of imaging tests, we can define the degree of hydrocephalus, define whether it is stable or progressive (preexisting hydrocephalus), define whether it is obstructive or non-obstructive, the level of obstruction and the most likely cause, such as stroke and tumors. It is also possible to define whether there is transependymal dissemination of cerebrospinal fluid (CSF) and check for future systemic complications. In the radiographic characteristics, it is still possible to verify if there is dilation of the ventricular system, which may be in the lateral ventricles and temporal horns, which may also have transependymal displacement of the cerebrospinal fluid (CSF), causing periventricular edema (FULLER et al., 2017).

Tomography in its screening can exclude emergency situations indicating the need for resonance. MRI neuroimages can suggest several tumor diagnoses, depending on several factors such as age, location, intrinsic characteristics of lesions (calcifications, necrosis, hemorrhage, invasion, cystic content, among



others). In the localization, supratentorial tumors are, with greater prevalence, primitive tumors of the neuroectoderm, astrocytomapilocytic and ependymoma. In the central location of the brain, craniopharyngiomas, gliomas of the optic tract, astrocytomas, neurocytomas and choroid plexus papillomas are observed. In the sella turcica, we have pineal tumors, germinomas and parenchymal tumors. In the region of the pons and midbrain, low- and high-grade gliomas are observed (PANIGRAHY et al., 2010). However, tumors located below the cerebellar tent are the most frequent in pediatrics.

However, the most frequent tumors are medulloblastomas, ependymomas and astrocytomas. Medulloblastomas tend to grow from the roof of the fourth ventricle to the medullary inferior fleece. Their magnetic resonance images seem hypointense on T2-weighted sequences compared to the substantia nigra, these tumors tend to have heterogeneous images such as cysts, hemorrhages, necrosis and calcifications. Ependymomas have a restricted appearance of solid or mixed (solid-cystic) tumor with some points of calcification. Astrocytomas appear as solid-cystic or hypodense mass, demonstrate in hypovascular images and usually cysts have less enhancement (BRANDÃO and YOUNG POUSSAINT, 2017). It is usually not used to measure intracranial pressure or to evaluate peritoneal ventricle shunt obstruction. Still, the use of magnetic resonance imaging in other causes is more used to aim at a neurosurgical treatment.

Advancing in imaging, clinical conduct and cell biology markers, neurosurgery remains a pillar of the effective treatment of brain tumors in pediatrics. Surgery has a large arsenal for tumor treatment that extends between CSF flow leads, biopsies, partial resections and complete resections of the pathology. There is a balance between maximum surgical resection and the attempt at lower surgical morbidity. The postoperative management plans are balanced between the possibility of adjuvant treatment such as radiotherapy and chemotherapy, and the biological history of the tumor (FILHO et al., 2021).

In recent years, chemotherapy has been gaining some role in the treatment of pediatric brain tumors, the protocols were initially designed from the impossibility and risk of radiotherapy to the age group below three years. These protocols have extended in other age groups, since there is a tendency for the combination of neurosurgery, radiotherapy and chemotherapy (MORTINI et al., 2013). In tumors of greater severity, such as high-grade gliomas, the role of chemotherapy is uncertain, the effectiveness is modest when combined with other therapies. In the case of malignant tumors, such as medulloblastoma, the toxicity of chemotherapy is added to tumor resection and applied radiotherapy. Typically, in the long term, sequelae such as mutism, hearing loss, metabolic changes and cognitive deficits are observed. (GLOD et al., 2016). Thus, the prognosis for pediatric tumor varies between reference centers, age group, histological subtypes and location.



2 METHODOLOGY

This is a descriptive, qualitative approach, of the case study type. This study seeks to understand a real-world phenomenon and assume that this understanding probably encompasses important contextual conditions pertinent to its case (YIN and DAVIS, 2007).

The information contained in this study was obtained through the review of the medical record, interview with the patient and conversation with the medical and nursing professionals at the Dom Luiz Gonzaga Fernandes Emergency and Trauma Hospital, Campina Grande, Paraíba.

3 CASE STUDY

The mother of L. S. F., female, 3 years old, born in Areal – PB, sought the Dom Luiz Gonzaga Fernandes Emergency and Trauma Hospital on May 9, 2023, reporting that her daughter had a seizure that lasted for 15 days. The patient had a history of headache, vomiting, intermittent fever for more than 1 year.

On admission, a CT scan of the skull was performed, which showed an expansive lesion with signs of bleeding, with acute hydrocephalus. On the same day, a peritoneal ventricle shunt valve (PVD) was placed, after the procedure she was admitted to the neurosurgery ward, presenting absence crises using phenytoin intravenously. It was necessary to perform sedation for an electroencephalogram (EEG). From the physical examination: Glasgow – 13; SpO₂ – 98%; FC – 113 bpm. The doctor prescribed: 0.9% saline solution 500ml and Diazepam 1ml EV, if necessary. Therefore, after ascertaining they arrived at the medical diagnosis of brain tumor + hydrocephalus.

On May 22, 2023, the patient was undergoing drug therapy with: dipyrone sodium 500mg, dexamethasone 4mg, sodium phenytoin 50mg, and if necessary 3 F/A of glucose. In addition, he presented spontaneous, eupneic breathing, a mild risk of pressure injury, without limitation to body care, and regarding sleep/rest, it was preserved. Thus, through the Systematization of Nursing Care (SAE), it was possible to diagnose it with anxiety, and for this, the nursing prescription was made, having as intervention:

- I. Administer analgesics as prescribed and reassess pain after medication administration, 6h/6h.
- II. General care + vital signs, 6h/6h.
- III. Keep the bed railings elevated, I continue – due to his young age.

Subsequently, after being assisted by the neurosurgeon, he concluded that the tumor was a Thalamus-Mesencephalic, patient with Glasgow 15, without focals, required surgical procedure. Therefore, for this, fasting was requested from 7am on May 23, 2023, central access by pediatric surgery and 600ml of blood reserve.

On May 23, 2023, the patient's surgery for a brain tumor took place, the procedure was described as uneventful. The postoperative period occurred in the pediatric ICU, on physical examination: compromised GE, hypoactive, pale, anicteric, acyanotic, afebrile to the touch. MV+ in AHT S/RA, FR –



22 irpm, SpO₂ – 100% in nasal catheter 1L/min. Regular heart rhythm in two strokes BNF S/S, HR – 102 bpm. Abdomen flat, depressible, flaccid, painless on palpation, palpable S/VMG, normoactive RHA+, presence of skin incision in the abdominal region, without phlogistic signs. Heated and well-perfused extremities, capillary refill time < 3s.

At the specific neurological physical examination: reagent to painful stimuli, photoreactive and isochoric pupils, presents dressing at the site of insertion of surgery. On May 25, 2023, the patient's brain tumor was taken for biopsy, so that there is the opinion, whether benign or malignant, so that the child begins chemotherapy, radiotherapy and the like.

4 FINAL CONSIDERATIONS

The case reported and the publications raised bring to light the discussion of the role of nursing in a complex situation such as the diagnosis of brain tumor accompanied by hydrocephalus. But also how the professional acts through the multiprofessional team in cases like these.

It is also perceived the breakdown of the family with the illness of a member and how much receiving correct information and at the right time minimizes this family "illness". It is necessary for the nursing professional to acquire knowledge about the disease and how to reduce the side effects of this treatment, which may be chemotherapy or radiotherapy and this regardless of whether the tumor is benign or malignant, because for both the same treatment is required.

Finally, the importance of the multidisciplinary team in this care is ratified, medical, nursing, psychology and physiotherapy teams should "walk" together, aiming at the well-being of the patient and his family.



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