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Nursing Care of a Child with Panhypopituitarism After Craniopharyngioma

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Abstract: This article summarizes a case of nursing management for a child diagnosed with craniopharyngioma. The targeted nursing interventions addressed panhypopituitarism, secondary hypothyroidism, secondary adrenal insufficiency, and central diabetes insipidus, which occurred as complications of the condition. The nursing priorities included the management of hypothyroidism, adrenal insufficiency, central diabetes insipidus, abnormal liver function, insulin resistance, and other related issues. The interventions resulted in stable hormone levels, maintenance of normal water and electrolyte balance, improved self-image perception, enhanced understanding of the disease and treatment plan by the child and their family, increased treatment compliance, and favorable therapeutic outcomes.

Keywords: Craniopharyngioma; Panhypopituitarism; Case study

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1. Introduction

Craniopharyngioma (CP) is a tumor originating from fetal residual tissue of ectodermal epithelium associated with the craniopharyngeal duct [1]. It is frequently observed in children aged 5 to 14 years, with a high prevalence in this group. Craniopharyngiomas account for 15% of pediatric intracranial tumors and 54% of pediatric sellar tumors, making them the most common intracranial tumor in children [2].

The primary clinical manifestations in children include intracranial hypertension, visual impairment, and pituitary or hypothalamic dysfunction [3]. Despite being classified as benign, craniopharyngiomas often infiltrate critical structures such as the pituitary stalk, hypothalamus, and optic chiasm due to their deep location and complex growth pattern, leading to post-operative hypopituitarism [4].

Hypopituitarism is a clinical syndrome [5] caused by inadequate function of the anterior or posterior pituitary lobes. It is characterized by decreased or absent hormone secretion, which can lead to stunted growth in children.

Studies have shown that among 15 children who underwent craniopharyngioma surgery, approximately 73.4% (11 out of 15) developed adenohypopituitarism and related endocrine and metabolic complications [6,7].

This report presents the diagnosis, treatment, nursing care, and follow-up of a child who developed panhypopituitarism following craniopharyngioma surgery.

2. Case data

2.1. General information

The patient, a 12-year-old male, initially experienced intermittent dizziness and headaches in 2020 without any apparent cause. During the course of the disease, there were no episodes of unconsciousness, slurred speech, limb twitching, facial asymmetry, incontinence, or instability while walking. However, his symptoms progressively worsened, leading to severe headaches described as lacerating pain, accompanied by nausea and vomiting. He was admitted to a local hospital on June 9, 2022, where a cranial MRI revealed a diagnosis of a "craniopharyngeal duct tumor," affecting the intrasellar, suprasellar, and anterior regions of the third ventricle (dimensions: 34 mm × 24 mm) and causing ventricle enlargement.

On June 26, 2022, he underwent surgical resection of the lesion under general anesthesia at the Department of Neurosurgery, The First Affiliated Hospital of Shihezi University. The postoperative recovery was uneventful. Following surgery, an out-of-hospital medication regimen was prescribed, including desmopressin (0.05 mg orally, twice daily) and prednisone (5 mg orally, once daily, reduced to 3.75 mg daily after two weeks).

On December 20, 2023, the patient experienced dizziness, weakness, abnormal taste, and appetite loss, accompanied by headaches and nausea, following self-discontinuation of his medication. After consultation, his treatment was adjusted to include hydrocortisone (10 mg at 8:00 AM and 5 mg at 4:00 PM), levothyroxine (25 μg orally, once daily, later increased to 37.5 μg), and desmopressin (0.05 mg orally, three times daily). Regular follow-up was recommended.

On July 30, 2024, the patient was admitted to the hospital with complaints of intermittent headaches and dizziness persisting for three years, along with growth retardation for two years. He was diagnosed with "craniopharyngeal duct tumor surgery, panhypopituitarism, and diabetes insipidus."

2.2. Physical examination at admission

(1) Vital signs: Body temperature, 36.5°C; pulse, 92 beats per minute; heart rate, 21 breaths per minute; blood pressure, 105/65 mmHg (1 mmHg = 0.133 kPa).

(2) Neurological status: Conscious, bilateral pupils equal and reactive to light with a diameter of 3 mm, no abnormalities in physical coordination.

(3) Anthropometric measurements: Height, 156 cm; arm span, 155.5 cm; weight, 73 kg; body mass index (BMI), 30.00 kg/m²; abdominal circumference, 103 cm.

(4) Developmental assessment: Immature physical appearance, no voice change, left testicular volume 4 mL, right testicular volume 5 mL (G1), penile length 4 cm, circumference 5.5 cm, and pubic hair at P1 stage.

(5) Systemic examination: Normal cardiopulmonary function, muscle strength, and muscle tone. No pathological or meningeal signs were noted.

(6) Laboratory findings:

(a) Hormonal panel: Free thyroxine (FT4), 6.67 pmol/L.

(b) Metabolic panel: Carbon dioxide binding capacity, 20.5 mmol/L.

(c) Urinalysis: Positive for Vitamin C (+1.4).

(d) Liver enzymes: ALT, 94.5 U/L; TBIL, 24.8 μmol/L; IBIL, 20.4 μmol/L; AST, 66.7 U/L; gamma-GT, 72.3 U/L; alpha-HBD, 184.2 U/L; LDH, 285.3 U/L.

Additional diagnostic tests, including the triprorelin stimulation test, insulin hypoglycemic growth hormone stimulation test, and oral glucose tolerance test, were conducted. Blood glucose levels and vital signs were closely monitored during these evaluations.

2.3. Treatment and outcome

The patient's diagnosis included:

(1) Panhypopituitarism: Secondary hypothyroidism, secondary adrenal insufficiency; secondary hypogonadism; growth hormone deficiency; bone loss; fatty liver.

(2) Central diabetes insipidus.

(3) Post-craniopharyngioma surgery.

(4) Hypertriglyceridemia.

(5) Liver insufficiency.

(6) Vitamin D deficiency.

Treatment plan:

(1) Secondary hypothyroidism: The patient was prescribed levothyroxine sodium tablets at a dosage of 50 μg orally, once daily.

(2) Secondary adrenal insufficiency: The treatment involved hydrocortisone at a dosage of 10 mg orally in the morning (8:00 a.m.) and 2.5 mg in the afternoon (4:00 p.m.). Dosages were adjusted after three months based on follow-up evaluations.

(3) Central diabetes insipidus: The patient was prescribed desmopressin acetate tablets at a dosage of 0.05 mg orally, three times daily (morning, afternoon, and before bedtime).

Outcome: The patient showed a positive response to the treatment plan, with improvements in hormonal stability, hydration, and electrolyte balance. Regular follow-up assessments indicated effective management of the symptoms, including stabilization of adrenal and thyroid function. Additionally, the interventions enhanced the patient's overall quality of life and ability to engage in daily activities.

3. Nursing measures

3.1. Nursing of panhypopituitarism

3.1.1. Nursing of hypothyroidism

(1) Condition monitoring: Continuous observation of the patient's vital signs is essential, particularly fluctuations in blood pressure and heart rate. Attention should also be paid to the patient's consciousness and mental state, with vigilance for signs of mental abnormalities such as lethargy and apathy.

(2) Drug management: Thyroid function indicators should be tested regularly during the administration of eumethylate. This ensures timely adjustment of the drug dosage based on test results, thereby preventing symptoms of hyperthyroidism due to excessive dosage or compromised thyroid recovery from insufficient dosage.

(3) Dietary maintenance: A diet plan tailored to the growth and development needs of adolescents should be provided. It should emphasize high protein, high vitamins, low fat, and low salt while encouraging increased intake of dietary fiber to promote intestinal health and prevent constipation.

3.1.2. Nursing of adrenal hypofunction

(1) Observation of the condition: Monitor for symptoms such as fatigue, loss of appetite, nausea, dizziness, and fever.

(2) Medication care: Administer hydrocortisone as prescribed to supplement adrenocortical hormones. Regular monitoring of the patient's blood sugar, blood pressure, and body weight is critical to ensure proper dosage and prevent complications.

3.1.3. Nursing of central diabetes insipidus

(1) Observation of the condition: Record and monitor the patient's water intake, urine output, and urine-specific gravity. Additionally, observe for symptoms such as tiredness, excessive thirst, dry skin, headache, memory loss, weight loss, and fever.

(2) Medication care: Educate the patient and their family about the potential adverse reactions of desmopressin tablets, including headache, abdominal pain, nausea, and nosebleeds. Emphasize the importance of appropriate water intake, measurement of fluid balance, and regular weight monitoring.

3.2. Nursing of abnormal liver function

(1) Observation of the condition: Monitor the patient for systemic symptoms such as fatigue, weakness, and lethargy. Additionally, pay attention to digestive symptoms such as loss of appetite, nausea, vomiting, abdominal distension, and abdominal pain, while noting the frequency, severity, and onset time of these symptoms.

(2) Medication care: Since the child is not undergoing liver protection treatment, care should be taken to avoid medications harmful to liver function. Encourage a regular lifestyle, including adequate rest and avoidance of staying up late.

3.3. Care of insulin resistance

(1) Observation of the condition: As the child is not currently prescribed insulin-resistant medications due to age, dietary control is crucial. Close monitoring of blood sugar levels is essential to assess and manage the condition effectively.

(2) Dietary guidance: Obesity and related abnormalities can lead to various interconnected health issues. Implementing flexible and scientifically informed dietary plans can reduce unnecessary medical expenditures and contribute to the goals of the "Healthy China 2030" initiative [9]. According to a survey, the BMI range for 7–12-year-old males in the Shihezi area is 18.13–20.72 [10]. The child's BMI of 30.00 kg/m² indicates a need for targeted dietary intervention. Based on the child's height, weight, and age, the recommended daily energy intake is approximately 1,800 kcal, distributed as follows:

(a) Protein: 20%–25%

(b) Fat: 15%–20%

(c) Carbohydrates: 55%–60%

A low-fat diet is advised, with regular and balanced meals. Emphasis should be placed on ensuring dietary diversity, with more than 12 types of food daily and over 25 types weekly. Cooking methods such as steaming, boiling, stir-frying, and cold mixing should be used to minimize oil consumption, which should be limited to 15–20 g per day. Unhealthy eating habits, such as rapid consumption and eating when not hungry, should be corrected. Foods high in sugar and energy should be avoided or significantly limited [11].

(3) Daily life and exercise: Establishing a normal 24-hour sleep-wake cycle is critical, and implementing behavioral therapy rules can help. Ensuring 8–10 hours of high-quality sleep daily supports growth hormone secretion, enhancing hormone-sensitive lipase activity in adipose tissue, which promotes lipolysis. This can reduce LDL-C, triglycerides, total cholesterol, and visceral fat levels, improving abdominal obesity [13]. Additionally, children should engage in at least 150 minutes of aerobic exercise weekly, as it stimulates growth hormone release and enhances skeletal muscle insulin sensitivity [14].

3.4. Nursing of patients with dizziness and headache

(1) Assessment of symptoms:

(a) The digital scoring method should be used to evaluate headache severity. Mild headaches are tolerable and may benefit from bed rest.

(b) The Dizziness Handicap Inventory (DHI) can assess the impact of dizziness on daily activities, while the Vertigo Symptom Scale (VSS) evaluates the frequency and severity of vertigo. The assessment indicated that the patient experienced intermittent mild dizziness with minimal impact on daily life.

(2) Nursing measures:

(a) During episodes of dizziness, bed rest is recommended.

(b) Bedside warning signs should be placed to prevent falls, and the patient should be educated on safety measures, including the use of bedside call devices and bed rails.

(c) The “get out of bed trilogy” protocol should be explained to the patient and their caregivers. Parents should ensure the child wears non-slip footwear.

(d) Ward inspections should be strengthened to monitor safety. It was noted that the patient did not experience any falls during hospitalization.

3.5. Psychological nursing

The unbalanced growth and development of children with hypopituitarism can result in feelings of inferiority when interacting with peers. Encouragement to build confidence in treatment is essential. Respect for the child and their family should be emphasized, offering full encouragement and support while patiently listening to their concerns and feelings. Positive psychological counseling should be implemented to foster a supportive environment. Children should also be guided to maintain good personal hygiene habits, such as regular bathing and grooming. Assistance in selecting appropriate, clean, and comfortable clothing can enhance the child’s external image, thereby boosting self-esteem.

3.6. Follow-up management

Long-term hormone replacement therapy is critical for managing hypopituitarism after craniopharyngioma, especially during adolescence. Regular follow-ups are necessary to adjust medication dosages as needed. Additionally, it is important to monitor sugar and lipid metabolism and islet cell function, as these factors are

linked to bone metabolism. In type 2 diabetes patients, bone formation and resorption are coupled processes that promote one another, maintaining a state of balance under normal circumstances [15].

After discharge, consistent follow-up through telephone consultations should be conducted to enhance the patient's compliance with medication and follow-up appointments. This ensures effective long-term management and monitoring of the condition.

4. Summary

Panhypopituitarism following craniopharyngioma disrupts the hormonal balance in the body, leading to metabolic instability and dysregulation in the synthesis, storage, and utilization of nutrients. This case report provides a detailed account of the condition and treatment process of a child with hypopituitarism after craniopharyngioma surgery. Comprehensive and effective nursing measures were developed to address the child's complications. These measures included managing physical and psychological issues, maintaining the child's self-image, and educating the patient and family about the condition. As a result, the child's condition improved significantly, offering valuable insights and practical experience for managing similar cases in the future.

Disclosure statement

The authors declare no conflict of interest.

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