



Influence of Preoperative Nutrition Outcomes in Pediatric Brain Tumor Surgery Patients

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DESCRIPTION

Pediatric brain tumors are among the most challenging conditions in neuro-oncology, representing the second most common type of childhood malignancy after hematological cancers. Surgical resection remains the primary treatment modality for many of these tumors, often followed by chemotherapy, radiotherapy, or a combination of both. While advances in neurosurgical techniques and perioperative care have improved survival, postoperative outcomes remain influenced by multiple factors, including nutritional status.

Nutrition plays a pivotal role in the perioperative management of pediatric patients, as it directly affects wound healing, immune function and overall recovery. Children admitted to the pediatric Intensive Care Unit (PICU) following brain tumor surgery are particularly vulnerable to malnutrition due to the metabolic stress of surgery, increased catabolic demands and reduced oral intake. Understanding the relationship between nutritional status and clinical outcomes is essential for optimizing postoperative care and long-term survival in this high-risk population.

Pediatric brain tumor patients

Children with brain tumors face unique nutritional challenges, both preoperatively and postoperatively. Preoperatively, the tumor itself may contribute to feeding difficulties due to nausea, vomiting, dysphagia, or raised intracranial pressure affecting appetite regulation. Additionally, corticosteroid therapy used to reduce cerebral edema often leads to fluid retention and muscle wasting, further complicating nutritional assessment.

Postoperatively, factors such as mechanical ventilation, sedation, impaired swallowing and altered consciousness can limit oral or enteral intake. In some cases, surgical complications such as cranial nerve palsies may lead to aspiration risk and feeding difficulties, requiring prolonged enteral or parenteral support.

Moreover, the hypermetabolic response associated with surgery increases energy expenditure, which if not met, can result in negative nitrogen balance and muscle loss.

Nutritional status on clinical outcomes

Numerous studies highlight the strong correlation between nutritional status and postoperative outcomes in pediatric neuro-oncology patients. Malnourished children tend to experience higher complication rates, prolonged hospital stays and increased morbidity. Malnutrition impairs immune function, reducing the ability to fight bacterial and viral pathogens. In PICU settings, this increases the risk of pneumonia, surgical site infections and bloodstream infections.

Protein deficiency delays collagen synthesis and angiogenesis, resulting in poor wound healing. This may contribute to cerebrospinal fluid leaks, wound dehiscence, or delayed recovery. Malnourished patients typically require longer PICU admissions due to complications, delayed ventilator weaning and slower functional recovery. Severe malnutrition is associated with increased mortality in critically ill children, including those undergoing neurosurgical procedures.

Long-term considerations

Nutrition not only affects immediate postoperative outcomes but also has long-term implications for survival and quality of life. Pediatric brain tumor survivors often experience late effects of treatment, including endocrine dysfunction, growth impairment and neurocognitive deficits. Adequate nutrition during the critical postoperative phase can mitigate some of these long-term consequences.

Furthermore, ongoing nutritional monitoring after PICU discharge is essential, particularly for children who continue to experience feeding difficulties or require adjuvant therapy. Outpatient follow-up with dietitians and pediatric oncologists

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ensures sustained nutritional support throughout the treatment continuum.

Nutritional status is a critical determinant of clinical outcomes in children undergoing brain tumor surgery and admitted to the pediatric intensive care unit. Malnutrition is associated with increased risk of infection, delayed wound healing, prolonged hospitalization and impaired neurological recovery. Early and accurate nutritional assessment, combined with timely intervention, can significantly improve both short- and long-term outcomes.

The integration of nutrition into perioperative care for pediatric brain tumor patients requires a multidisciplinary approach, involving neurosurgeons, intensivists, dietitians and nursing staff. Beyond immediate recovery, nutritional support plays a vital role in ensuring long-term survival, growth and cognitive development. Recognizing nutrition as an essential component of comprehensive care represents a vital step toward improving survival and quality of life in pediatric neuro-oncology.