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Massive Transfusion of 5 U Packed Redblood Cells, 3 U Fresh Frozen Plasma, and 160 cc of Platelets in a 14-Month-Old Patient

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Patient: Female, 1
Final Diagnosis: Parietooccipital brain tumor
Symptoms: Drowsiness • failure to thrive • irritability • seizure-like activity
Medication: —
Clinical Procedure: Massive transfusion during tumor resection
Specialty: Anesthesiology

Objective: Management of emergency care
Background: We present a case in which extremely rapid massive transfusion was successfully used to combat severe acute bleeding during a parietooccipital tumor resection in a 14-month-old patient.
Case Report: An 8-kg patient was found to have a 4×5×5-cm parietooccipital tumor on computed tomography scan, for which resection was urgently planned. Sudden acute bleeding was encountered, which was communicated to the anesthesia team. Transfusion was initiated and a total of 5 units of packed red blood cells, 3 units of fresh frozen plasma, 160 ml of platelets, 200 ml of albumin, and 500 ml of 0.9% normal saline were transfused during a 4-h period. We administered 4 g of mannitol and 0.8 mg of furosemide to deal with anticipated fluid overload. The patient was sent to the intensive care unit and extubated the next day. No clinically significant hemostatic or fluid overload complications were noted after the treatment.
Conclusions: Massive transfusion (MT) was found to be safe and effective in this case. Most of what we know about pediatric MT is an extrapolation of data from adult studies. Although practical, it might not be ideal due to the differences in the physiology and incomplete development of hemostatic mechanisms in children, especially those younger than 12 months. Studies evaluating the use of pediatric MT protocols have not shown a significant advantage over transfusion per clinician discretion.

MeSH Keywords: Anesthesia • Anesthesiology • Blood Loss, Surgical • Blood Transfusion • Hospitals, Pediatric • Pediatrics

Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/896820>

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Background

We present the case of a 14-month-old patient, weighing 8 kilograms, with no other significant past medical/surgical/birth history who was undergoing a parietooccipital tumor resection. The surgery was complicated by severe acute bleeding. This was successfully combated with extremely rapid massive transfusion to allow for successful resection of the tumor.

Case Report

The patient came to the Emergency Department with new-onset seizures, irritability, and vomiting and was found to have a 4×5×5-cm parietooccipital tumor on CT scan (Figure 1). A magnetic resonance imaging (MRI) scan was planned for the next day under general anesthesia, followed by a resection of the tumor.

Access: A 22-g arterial line and a 20-g peripheral intravenous (PIV) line were placed, in addition to a preexisting 22-g PIV. Two units of packed red blood cells and 2 units of fresh frozen plasma were typed and crossed prior to surgery.

Initial medications: Four g of Mannitol was given along with 4 mg of Dexamethasone.

Intraoperative severe acute bleeding: The surgeon found that the scalp and skull were extremely vascular. Skull bleeding was controlled with cautery, powdered Gelfoam, and bone wax. When the pia mater was coagulated, the tumor came herniating out. Severe acute blood loss ensued. Transfusion was initiated and total of 5 units of packed red blood cells, 3 units of fresh frozen plasma, 160 ml of platelets, 200 ml of albumin, and 500 ml of normal saline was given during the 4-h surgery.

Additional medication: Four g of Mannitol and 0.8 mg of Furosemide were administered to deal with anticipated fluid overload.

Labs: Arterial blood gases with electrolytes were obtained every 20–30 min. Calcium was replaced as needed.

There were several brief periods during which the patient was hypotensive, each lasting less than a minute. At times when the blood pressure dropped significantly, surgery was stopped and pressure was applied by the surgeon with cottonoid patties and thrombin-soaked cotton balls. During these pauses, small boluses of phenylephrine and epinephrine were used to counteract hypotension while the anesthesia team caught up with the blood loss. The surgeon worked quickly while transfusion continued. A duraplasty was performed after the tumor was removed.

Figure 1. Parietooccipital tumor.

Estimated Blood Loss: 1.3 L, Urine output: 280 ml, Length of surgery: 4 h.

The patient was transported to the Pediatric Intensive Care Unit by the anesthesia team. The patient was hemodynamically stable and moving all extremities but with minimal right-sided weakness. The patient was extubated and discharged on POD#6.

Discussion

Massive transfusion (MT) in children has been defined as greater than 40 ml/kg of all blood products given at any time in the first 24 h [1]. Diab, Wong, and Luban suggested defining pediatric MT as transfusion of >50% total blood volume (TBV) in 3 h, transfusion >100% TBV in 24 h, or transfusion support to replace ongoing blood loss of >10% TBV per min [2]. Most of what we know about pediatric MT is an extrapolation of data from adult studies. Though practical, it might not be ideal due to the differences in the physiology and incomplete development of hemostatic mechanisms in children, especially those younger than 12 months [3,4]. In our case, prompt recognition and communication by the surgeon helped initiate transfusion early on. Most massive transfusion protocols (MTPs) encourage a 1:1 transfusion ratio. A slightly higher ratio was maintained due to the risk of fluid overload in our patient. Hemostatic complications associated with massive transfusion have mainly been studied in animals and adult trauma patients [5]. Complications from MT include transfusion reaction and metabolic and immunologic reactions [6]. A widely used pediatric MTP suggests performing laboratory analyses of hemoglobin, platelet count, coagulation profile (including fibrinogen and fibrin degradation products), calcium, potassium, lactate, and pH during the course of MT to detect these complications and treat them early on [7]. Tranexamic acid use has been studied in pediatric trauma and surgery patients, demonstrated decreased mortality and perioperative

blood transfusion [8,9]. Studies evaluating the use of pediatric MTPs have not shown an advantage over transfusion per clinician's discretion [10].

Conclusions

Massive transfusion in this scenario was found to be safe and effective. Studies on pediatric MTPs have been limited by

sample size and adherence to protocol. Further studies need to be undertaken to identify a safe and cost-effective transfusion strategy in children.

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