A Rare Presentation of Diabetes Insipidus, Hypertension, and Loss of Motor Evoked Potentials in Non-Pituitary Neurosurgery, What Else Can Go Wrong?

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INTRODUCTION

Diabetes insipidus (DI) is a rare condition in which the kidneys cannot concentrate urine normally, and this leads to an increase in the excretion of water via dilute urine. ADH (or vasopressin) controls the amount of water excreted in the urine. 1 Nephrogenic DI is caused by a failure of the kidneys to respond to ADH. Central DI can be caused by damage to the hypothalamus or pituitary gland. DI in the setting of neurosurgery outside of the pituitary region is uncommon and has not been detailed in pediatric literature. Benign sheath tumors in pediatric cases have not been associated with hypertension or DI. This case report will discuss the specifics of this case, the perioperative management, the incidence of DI in non-pituitary neurosurgeries, and the management of losing MEPs in the setting of neurosurgery.

BACKGROUND

An 8-year-old girl presented to the OR emergently to undergo a craniotomy for resection of a rapidly growing right frontotemporal tumor. She was otherwise healthy until she presented with multiple episodes of absence seizures and headaches. An outpatient MRI showed a right frontotemporal enhancing lesion with evidence of ulceration. Herniation. Due to the mass effect and herniation, she was brought to the OR for resection of the tumor under deep anesthesia, SSEP, and MEP monitoring.

PERIOPERATIVE MANAGEMENT

The patient was premedicated with midazolam and induced with propofol and fentanyl. Maintenance of anesthesia was achieved with remifentanil and 1/2 MAC of desflurane. Approximately one hour after incision, she presented with increased urine output of over 20 ml/kg/hour. Motor signals were then lost during surgical manipulation of the tumor, so the inhalational agent was discontinued, and a propofol infusion was started. Due to the increased urine output, labs were sent, and results were consistent with diabetes insipidus.

Central diabetes insipidus is a heterogeneous condition characterized by polyuria and polydipsia due to a deficiency of arginine vasopressin. 2 Desmopressin was administered intraoperatively as it has been proven to be effective in treating excessive urine output in children with DI. 3 After two doses of DDAVP and fluid resuscitation throughout the surgery, the clinical picture stabilized although urine output remained high.

The patient continued to present with increased arterial blood pressures, which correlated with tumor manipulation. She required a nicardipine infusion. Considering the persistent intraoperative episodes of hypertension during tumor resection and the associated increased risk of bleeding, the neurosurgeon decided to do a subtotal resection.

The patient was extubated at the end of the procedure with an intact neurological exam and sent to the ICU. Pathology results revealed the tumor to be a benign nerve sheath tumor. Postoperatively, the hypertension and diabetes insipidus resolved without further interventions.

DISCUSSION

The occurrence of diabetes insipidus was not expected in this surgery as this condition has rarely been reported in neurological cases outside of the pituitary region.

Common causes of central DI include:

• congenitalthalamic/pituitary disorders
• acquired conditions such as trauma or tumor involving the thalamic/pituitary areas. 4

In addition to unexpected DI, this patient developed intraoperative hypertension during tumor manipulation. This finding was unique in that the tumor was later found to be benign and non-hormone secreting. Nicardpine was used as it has a fast onset and can be titrated rapidly for controlled blood pressure reduction.

The patient also lost MEPs during the surgery. MEPs are useful to monitor for ischemia, particularly of the alpha motor neurons. MEPs are very sensitive to anesthetics, and all halogenated anesthetics cause dose-dependent depression of MEP signals due to inhibition of pyramidal activation of spinal motor neurons. A propofol infusion was started in this case as it does not suppress MEP signals. Although bolus administrations of propofol can lead to MEP signal loss, its rapid redistribution allows signals to return within minutes. 5 Fortunately, at the end of this case, the patient woke up and moved all extremities, indicating little possibility of ischemia to motor neurons.

This case report is rare secession of a benign tumor, and significant, unexpected intraoperative conditions occurred; several of which have not described in the pediatric literature.

Urine output:

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<th>POD 2</th>
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<tr>
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Labs:

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<td>Serum Sodium</td>
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References