Use of Serum Prolactin as a Marker for Perioperative Seizure

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Introduction

- The differential diagnosis of myoclonus and seizure-like activity during anesthesia includes:
  - Malignant hyperthermia
  - Neurological malignant syndrome
  - Serotonin syndrome
  - Stroke
  - Seizure
- Serum prolactin may be a useful marker to differentiate seizure from other mechanisms

Case 1

- 71 year old female with essential tremor who underwent deep brain stimulator lead placement one week prior presented for battery and lead extension implantation under general anesthesia
- No prior history of seizure
- Upon emergence:
  - Unremarkable induction and intraoperative course
  - Prolactin: 67 ng/mL (3-27 ng/mL)
- Work-up in operating room:
  - Serum prolactin
  - Creatine kinase: 92 (38-176 U/L)
  - Lactate: 1.6 (0.6-2.3 mmol/L)
  - Electrolytes and glucose: WNL
- Seizure
- Preoperative history:
  - Myoclonus:
  - Anti-seizure medications: no
- Clinical risk factors:
  - Afebrile
  - Clonic movements
  - Masseter spasm
  - Hypertensive
- Delayed awakening
- Work-up in operating room:
  - Electrolytes and glucose: WNL
  - Arterial blood gas: 7.276/202/28/1
  - Lactate: 1.6 (0.6-2.3 mmol/L)
  - Creatine kinase: 52 (38-176 U/L)
  - Prolactin: 67 ng/mL (3-27 ng/mL)
- Hypercarbia and mental status improved → extubated → uneventful recovery in post-anesthesia care unit
- Repeat prolactin 6 hours later: 6 ng/mL
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- Uneventful recovery in post-anesthesia care unit

Case 2

- 65 year old female with a left parietal lesion and associated complex partial and generalized tonic-clonic seizures presented for Stealth-guided parietooccipital biopsy
- During inhalation of nitrous oxide for difficult intravenous catheter placement:
  - Became unresponsive
  - Demonstrated unusual vocalizations consistent with complex partial seizure
- Work-up in operating room:
  - Prolactin: 83 ng/mL
  - Repeat prolactin 8 hours later: 11 ng/mL
- Seizure
- Generalized tonic clonic seizures presented for Stealth-guided parietooccipital biopsy
- “Became unresponsive” as noted by anesthesiologist
- Work-up:
  - Utility of serum prolactin assay has not been established in the evaluation of anesthesia side effects
  - Serum prolactin cannot distinguish seizure from syncope
  - Serum prolactin can be a useful marker for myoclonus if a serum level is obtained within 10-20 minutes after a suspected event and a baseline level is obtained 6 hours later
- To our knowledge, this is the first report of the use of serum prolactin to diagnose seizure in the perioperative period

Discussion

- Prolactin is a hormone secreted by the anterior pituitary gland and is tightly regulated by the hypothalamus (Figure 1):1
- An acute increase in serum prolactin can occur following a seizure, an effect hypothesized to be related to epileptic activity influencing hypothalamic function (Figure 2).1
- Hyperprolactinemia can occur within 10 minutes of the ictal event and typically resolves within 6 hours.1
- In non-surgical patients, an acute increase in serum prolactin accurately distinguished between epileptic seizures (generalized tonic-clinic and complex partial) and psychogenic non-epileptic seizures.1
- Other factors (e.g. surgical stress, induction medications (specifically, fentanyl), and antidepressants/antipsychotics) may lead to hyperprolactinemia (Figure 1).1
- In non-surgical patients, an acute increase in serum prolactin accurately distinguished between epileptic seizures (generalized tonic-clinic and complex partial) and psychogenic non-epileptic seizures.1
- Other factors (e.g. surgical stress, induction medications (specifically, fentanyl), and antidepressants/antipsychotics) may lead to hyperprolactinemia (Figure 1).1
- American Association of Neurology (AAN) Practice Guidelines:2,3
  - Elevated serum prolactin, when measured in an appropriate clinical setting at > 6 hours after a suspected event, should be considered a useful adjunct to differentiate epileptic seizure from non-epileptic seizure
  - Serum prolactin, when measured > 6 hours after a suspected event, should be representative of baseline prolactin level
  - Serum prolactin cannot distinguish seizure from syncope
  - Utility of serum prolactin assay has not be established in the evaluation of status epilepticus, repetitive seizures, or neonatal seizures4
- The degree of hyperprolactinemia and its rapid resolution strongly suggests seizures in our patients.

Conclusions

- In the appropriate clinical context, prolactin can be a useful marker for seizure if a serum level is obtained within 10-20 minutes after a suspected event and a baseline level is obtained 6 hours later.
- To our knowledge, this is the first report of the use of serum prolactin to diagnose seizure in the perioperative period.

References