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Pituitary apoplexy during pregnancy with transsphenoidal resection and intraoperative fetal monitoring: A case report

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ABSTRACT

Introduction: Prolactinomas resulting in pituitary apoplexy are an uncommon obstetrical complication. The hemorrhage can cause compression and necrosis of the pituitary gland as well as the optic chiasm, necessitating surgical intervention.

Case: A 35-year-old woman, G0, presented for an infertility consult with a prior diagnosis of polycystic ovarian syndrome. Evaluation for oligomenorrhea found an elevated prolactin level of 69.76 ng/mL, an elevated DHEA-S of 524, and HgbA1c of 5.7%. The patient denied visual or neurological symptoms. Infertility treatment was started, and magnetic resonance imaging (MRI) of the brain was recommended; however, the patient forewent imaging. Within a few months, she was pregnant. At 27 weeks of gestation, the patient developed sudden visual field loss to the right eye and presented to her optometrist. MRI of the pituitary identified a sellar mass with suprasellar extension, consistent with a recently hemorrhaged pituitary macroadenoma or pituitary apoplexy with displacement of the optic chiasm. Due to the risks of permanent optic nerve damage, the patient underwent endoscopic endonasal transsphenoidal hypophysectomy with intraoperative fetal monitoring at 30 weeks 1 day of gestation. At 39 weeks of gestation a cesarean section was performed due to the recent procedure. Her delivery and postpartum period were without complications.

Discussion: Pituitary apoplexy presenting in pregnancy is a rare and potentially life-threatening disorder due to an acute ischemic infarction or hemorrhage of the pituitary gland. Surgical management of the pituitary gland in pregnancy is rarely recommended, except in cases of severe visual disturbance and uncontrolled Cushing's disease.

1. Introduction

Prolactinomas among women occur at an incidence of 30 per 100,000, most commonly between the ages of 25 and 32 [1]. The anterior pituitary gland grows in size by as much as 136% in pregnancy due to a relative increase in the number of lactotrophs [2,3]. During pregnancy, the risk of symptomatic tumor enlargement for microprolactinomas, defined as less than 10 mm, is estimated to be 2–3%. For macroprolactinomas, defined as larger than 10 mm, the potential for growth is higher, around 20–30% [4].

The growth of a pituitary adenoma during pregnancy can cause compression of the pituitary vascular network in the interstellar compartment [5]. This growth and compression can result in hemorrhage and necrosis of the gland [5]. Hemorrhage of a pituitary adenoma is commonly referred to as pituitary apoplexy. Pituitary apoplexy presents with a sudden and severe headache, loss of consciousness, nausea, and vomiting. If the optic chiasm is involved, visual field testing is likely to reveal bitemporal hemianopsia [5].

Surgical management of the pituitary gland during pregnancy is rarely recommended, except in cases of severe visual disturbance or uncontrolled Cushing's disease [6]. Resection should be performed within one week of onset of visual symptoms, as long as the patient and

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fetus are stable [5]. Complications that can arise from transsphenoidal resections include cerebrospinal fluid leak, sinusitis, and meningitis [7].

Herein is reported a case of transsphenoidal resection of a ruptured pituitary macroadenoma in the third trimester of pregnancy with intraoperative fetal monitoring to add to the medical literature on this rare event.

2. Case Presentation

A 35-year-old woman, G0, presented for an infertility and oligomenorrhea consult. Her past medical history was significant for polycystic ovarian syndrome. During the infertility workup, her prolactin was found to be elevated at 69.76 ng/mL (reference range: 5.18–26.53 ng/mL), dehydroepiandrosterone sulfate elevated at 524 μg/dL (reference range: 45–295 μg/dL), and low estradiol at 19.2 pg/mL. Luteinizing hormone, follicle stimulating hormone, testosterone, and anti-Mullerian hormone were all within normal limits. With her high prolactin level, the possibility of a pituitary microadenoma and indication for magnetic resonance imaging (MRI) were discussed and the latter ordered; however, the patient did not opt to undergo imaging. 0.25 mg of cabergoline was initiated once weekly as well as letrozole 5 mg during cycle days two through seven with follicle ultrasound studies. Her prolactin level decreased to 4 ng/mL one month after the initiation of cabergoline and the patient conceived on her fifth round of letrozole. Cabergoline was discontinued after pregnancy was recognized.

Her pregnancy was complicated by infection with COVID-19 at 13 weeks of gestation. This was treated with a monoclonal antibody infusion, which, at the time, was supported by guidelines from the Society of Maternal Fetal Medicine and the NIH [8]. Her symptoms were only flu-like, including fever, cough, and chills. At 17 weeks of gestation, she reported fatigue, morning headaches, and insomnia; she attributed these to her recent COVID-19 infection. Her pregnancy was further complicated with gestational diabetes mellitus (GDM), which was diagnosed in the second trimester. Her GDM was diet controlled.

At 22 weeks 3 days of gestation, she had an anatomy scan due to advanced maternal age (AMA) and recent COVID-19 infection. Biometric measurements of the fetus were consistent with gestational age; fetal anatomy and amniotic fluid level appeared normal. She was having trouble sleeping but was taking doxylamine as treatment. At this visit she also began 162 mg of aspirin for preeclampsia prophylaxis.

At 27 weeks 5 days of gestation, the patient presented to her optometrist with blurry vision. Visual field deficits in the right eye were identified. Subsequent MRI of her pituitary identified a sellar mass with suprasellar extension measuring 2 × 1.3 × 2.1 cm. T1 shortening and fluid level were consistent with recently hemorrhaged pituitary macroadenoma / pituitary apoplexy (see Fig. 1). The mass resulted in superior displacement of the optic chiasm with erosion of the bone. The lesion extended into the cavernous sinus bilaterally. Aspirin was discontinued at this time.

At her neurology consult, a physical exam demonstrated decreased acuity in both eyes. On optical coherence tomography, there was no thinning of the optic discs, but visual fields showed bitemporal hemianopia. A repeat prolactin test revealed an elevation to 222.23 ng/mL. Thyroid stimulating hormone, thyroxine, and insulin-like growth factor 1 were all within normal limits. With increased risk of permanent damage to the optic nerve, the patient underwent endoscopic endonasal transsphenoidal hypophysectomy with harvest of abdominal fat graft at 30 weeks 1 day of gestation. She was placed under general anesthesia with continuous intraoperative fetal monitoring.

Post-operatively the patient's vision returned to baseline. She noted nasal congestion and loss of taste and smell. The postoperative period was also complicated by diabetes insipidus. She received one dose of desmopressin and her symptoms of polyuria and polydipsia resolved by postoperative day 2. She was placed on levothyroxine, a tapering dose of hydrocortisone, and levetiracetam for seizure prophylaxis. She felt sufficient fetal movement throughout her postoperative stay and had external fetal monitoring three times a day for 30 min.

Follow-up MRI showed a residual sellar/suprasellar mass that might have represented postoperative change, but residual tumor could not be excluded (see Fig. 2). Continued imaging after pregnancy was recommended.

At 39 weeks of gestation, a successful Cesarean section was performed. The patient delivered at an institution without neurosurgery coverage. Due to the early postoperative period and facility that would not be able to manage complications if they were to arise, it was felt a cesarean section was the safest option. This was done in an abundance of caution given the unique rural community. At her 6-week postpartum check-up, both the patient (with no residual visual symptoms) and her newborn were doing well.

3. Discussion

Pituitary apoplexy is a rare and potentially life-threatening disorder due to an acute ischemic infarction or hemorrhage of the pituitary gland [9]. As the pituitary adenoma grows during pregnancy, it can cause compression of the hypophyseal artery and the fragile pituitary vascular network contained within the interstellar compartment [5]. With the expansion of the gland seen in the setting of a preexisting adenoma, the gland can outstrip its blood supply, resulting in an acute ischemic effect [5].

Symptoms of apoplexy are the initial presentation in up to 80% of pituitary adenomas [9]. Risk factors of apoplexy include medications such as dopamine agonists, anticoagulants or antiplatelets, as well as patient conditions such as hypertension and pregnancy [10]. The characteristic presentation of an apoplexy is the sudden onset of retro-orbital headache, vomiting, visual impairment and decreased consciousness;

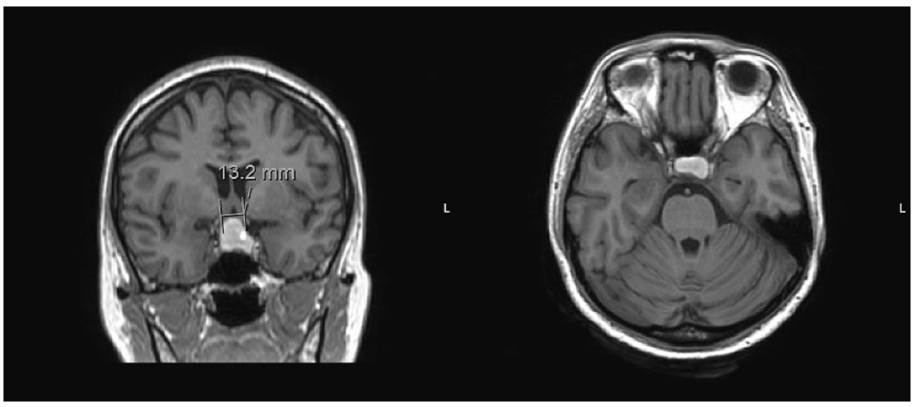

Fig. 1. Coronal and transverse MRI of the ruptured pituitary mass prior to surgery.

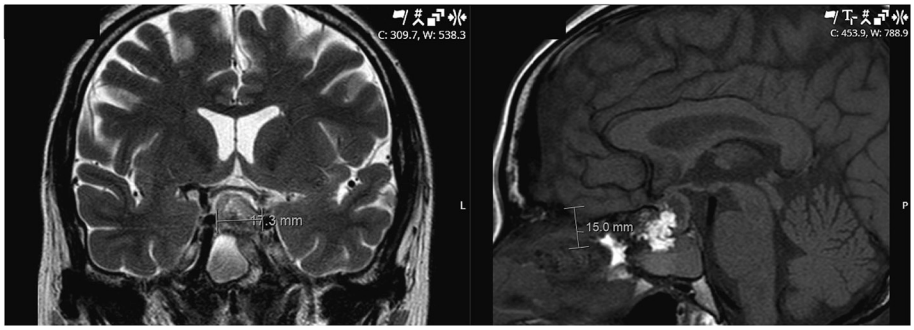

Fig. 2. Postoperative coronal and sagittal MRI demonstrating resection of the mass after endoscopic endonasal transsphenoidal resection.

cranial nerves 2, 3, 4, and 6 are the most common nerves to be impacted [11]. Neurosurgery, endocrinology, and obstetrics should all be included in the decision making and care for a gestational pituitary apoplexy [11].

Management of pituitary apoplexy requires immediate assessment of hemodynamic stability, fluids, electrolytes and endocrine hormone replacement. Even in the absence of symptoms from adrenal crisis, all patients should receive a bolus of 100–200 mg hydrocortisone with an additional 50–100 mg every 6 hours [5]. Further treatment of the apoplexy is determined on a case-by-case basis. Conservative medical management is preferred in conscious patients without visual field or acuity defects [5]. Invasive decompressive surgeries are reserved for those with severe symptoms, including altered consciousness, uncontrolled Cushing's disease, hypothalamic involvement, or progressive visual impairment, as seen in this case [5]. Decompressive surgery should ideally be performed within one week following the onset of visual symptoms, assuming both the patient and fetus are stable [5]. Endoscopic endonasal or microscopic sublabial transsphenoidal approaches are most commonly used; however, craniotomies may be attempted for larger tumors extending over the chiasm or laterally to the temporal fossa [5].

In both endoscopic endonasal and microscopic sublabial transsphenoidal approaches, the patient is placed in the supine position and vasoconstrictive agents are administered to decongest the cavities and gingival mucosa [7]. In the endonasal transsphenoidal approach, a passage is created between the nasal septum and middle turbinate [7]. The sphenoid ostium is widened, and the posterior edge of the septum is removed to access the pituitary gland [7]. Abdominal fat grafts are harvested to repair the skull base to combat the complication of cerebrospinal fluid leakage [12]. Guo et al. conducted a meta-analysis comparing the endoscopic endonasal and microscopic sublabial transsphenoidal approaches. Their findings suggested that the endoscopic endonasal approach resulted in a lower incidence of meningitis and a higher incidence of visual improvement when compared to the microscopic sublabial approach [13].

Complications of endoscopic endonasal transsphenoidal approach include cerebrospinal fluid leak, meningitis, and visual deterioration [12]. Early resection, within 72 h of symptom onset, versus delayed resection, after 72 h, did not significantly improve visual deficits, total visual loss, resolution of oculomotor palsy, recovery from hypopituitarism, or non-neuroendocrine signs and symptoms such as headache and encephalopathy [14].

Postoperatively, endocrine function is important to assess. Transient diabetes insipidus has been seen in up to 16% of patients [11]. Thyroid function tests should be drawn four days after surgery [11]. Transsphenoidal surgeries generally have quick recovery times and short hospital stays [3].

The patient in this case presented with headaches and visual field defects, and had a known history of hyperprolactinemia. MRI confirmed a pituitary apoplexy. She underwent endoscopic endonasal transsphenoidal hypophysectomy prior to term. Postoperatively, she had diabetes insipidus that resolved before discharge from the hospital. Her visual symptoms and headaches resolved immediately after resection. She underwent a successful Cesarean section at 39 weeks of gestation.

Contributors

Megan Corn contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

Austin Nickell contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

Collette Lessard contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

Adam Jackson contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript, undertaking the literature review and revising the article critically for important intellectual content.

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