

# ANESTHETIC MANAGEMENT OF 29 WEEK PREGNANT PATIENT UNDERGOING CRANIOTOMY FOR PITUITARY MACROADENOMA

## - A Case Report -

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### Introduction

Intracranial space-occupying lesions are rarely present during pregnancy and these disorders seldom require immediate surgical attention. The most common among them is pituitary tumor of which 15-35% has a chance of enlarging during pregnancy<sup>1,2</sup>. The decision to proceed with surgical intervention depends on the site, size, and type of the tumor, gestational age and neurological signs as well as the patient's wishes. In case of surgery, multidisciplinary approach is essential in perioperative period.

Maternal alterations during pregnancy may complicate the anesthetic management of patients and increase monitoring requirements for safety of both mother and fetus<sup>3</sup>. Unfortunately, this may become a challenge to all attending physicians, but especially to the anesthesiologists, as the anesthetic plan must meet the needs of both pregnancy and neurosurgery<sup>4</sup>.

Here, we present 29-week pregnant patient undergoing craniotomy for pituitary adenoma and discuss the features of anesthesia providing maternal and fetal safety.

### Case Report

A 29 year-old parturient (gravida 3, para 1, D/C 1, C/S 1) at 27 weeks of pregnancy was presented with blurred vision and headache. She was admitted to the hospital for differential diagnosis of possible causes such as migraine, infection, hemorrhage and increase in intracranial pressure. Her past medical history was unremarkable. Her physical examination disclosed a decreased visual acuity and radiological examination revealed a suprasellar mass lesion consistent with macroadenoma at magnetic resonance imaging (Fig. 1).

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*Fig. 1*  
*MR images showing suprasellar mass lesion*  
*consistent with macroadenoma*  
*(Axial FLAIR and sagittal spin echo T1 weighted images).*



The mass was heterogeneous and hyperintense, 3 x 2.7 cm, elevating vascular structure anteriorly with compression of optic chiasm. After a multidisciplinary consultation with the neurosurgery, obstetrics and anesthesiology departments, initial decision was to delay the surgery until after delivery. However, two weeks later, a rapid deterioration in patient's visual acuity was detected and physical examination disclosed a total vision loss in the right eye and hemianopsia in the left eye. She was scheduled for an urgent surgical intervention after reconsultation.

The preanesthetic assessment revealed a pregnancy at 29<sup>th</sup> week and parturient was otherwise healthy. Fetal cardiocography and ultrasound examination revealed that fetus was well and concordant with its gestational age.

Neurosurgeons preferred a craniotomy for emergent approach. Intraoperative monitoring included the routine clinical standards for cranial tumor surgery such as heart rates 5-lead ECG, invasive arterial blood pressure, peripheral O<sub>2</sub> saturation, end tidal CO<sub>2</sub>, central venous pressure acquired by threading a central venous catheter into subclavian vein, body temperature and urine output throughout the anesthesia. Arterial blood gases were checked every twenty minutes. Furthermore, fetal heart rate (FHR) was monitored by cardiocography prior to operation and throughout the surgery and periodically for 24 hours

postoperatively. A senior resident obstetrician was ready for assessment of FHR and an urgent caesarean section (C/S) was planned in case of non-reassuring fetal stress at the same operating theatre where suitable set of surgical instruments were also available. In addition, neonatologist was informed about the case and neonatal ICU was available as if the C/S had to be performed, the baby would have born preterm.

Patient was premedicated with ranitidine 50 mg and metoclopramide 10 mg IV prior to operation. Anesthesia was induced with thiopental 400 mg, fentanyl 100 µg, lidocaine 60 mg and dexamethasone 8 mg intravenously. Intubation was facilitated by vecuronium 8 mg. The trachea was orally intubated, 7.5 mm at first attempt without any difficulty with application of cricoid pressure. A left lateral tilt was accomplished to prevent vena cava compression and reverse trendelenburg to the operating table to decrease intracranial pressure. A heated blanket was placed under the patient to keep normothermia. Anesthesia was maintained with fentanyl infusion 0.5-3 µg kg<sup>-1</sup>hr<sup>-1</sup>, 0.6-0.8 MAC isoflurane and 50% O<sub>2</sub> in air. Controlled ventilation was with a tidal volume 8 mL kg<sup>-1</sup> sustaining an end tidal CO<sub>2</sub> values at 30 ± 2 mmHg.

Surgery lasted approximately for 5 hours. The maternal heart rate and blood pressure remained within normal limits during operation (Fig. 2A and B). Arterial blood gases were in normal range and normothermia was carefully maintained.

Fig. 2A

Maternal and fetal heart rates throughout surgery (Beat/min)

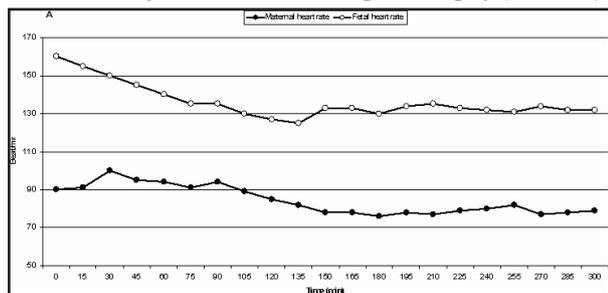
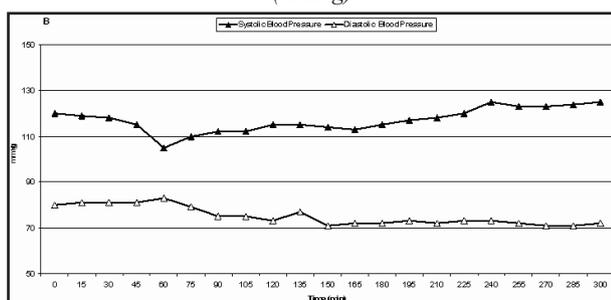


Fig. 2B

Maternal blood pressure values throughout the surgery (mmHg)



At the end of surgery, the neuromuscular blockade was reversed and the patient was extubated fully awake in the operating room and transported to the ICU uneventfully.

Left temporal anopsia remained unimproved in her neurological examination at discharge from hospital, which was her main complaint preoperatively. Thereafter, she had C/S at 35<sup>th</sup> week of her pregnancy because of preterm labor and gave birth to a low birth weight child (1870 grams).

## Discussion

The incidence of brain tumors during pregnancy is rare<sup>5,6</sup>. However, this rare problem may require urgent surgical interventions as brain tumors tend to enlarge during pregnancy due to fluid retention, increased blood volume and hormonal changes<sup>7</sup>. Management of intracranial tumors in pregnancy is stressful for everyone involved and it should be individualized for the patient<sup>8,9</sup>. The patient's features and own wishes have to be considered while providing safety of two patients, the mother and the fetus<sup>9</sup>.

The anesthetic management of a parturient undergoing a non-obstetric surgery includes close monitorization of maternal hemodynamics and

respiratory parameters. Continuous and attentive monitoring is also essential for follow-up of the fetus' well-being during surgery and anesthesia<sup>10</sup>. However, necessity of fetal heart rate monitoring is still a controversial issue<sup>8,11,12,13,14</sup>. The purpose of FHR monitoring is to detect fetal hypoxia and metabolic acidosis, which may result in tissue damage or fetal death<sup>15</sup>. The baseline FHR is typically between 120-160 beat/minute in a healthy fetus beyond 20 weeks. Alterations in the baseline rate and variability should be cautiously interpreted by trained personnel, because normal variability reliably indicates the absence of fetal distress, however vice versa does not. Many factors may mimic fetal stress on fetal heart rate monitoring such as inhalational anesthetics, opioids, barbiturates, parasympatholytics, fetal sleep cycles, hypothermia. The risk of misinterpretation under general anesthesia always exists and may lead to unnecessary surgery<sup>9,16</sup>. In addition, FHR monitoring requires additional trained personnel in the operating theatre and an emergency plan must be available in case of urgency. We advocate the use of FHR monitoring, whenever feasible, since constant maternal hemodynamics do not assure fetal's well-being<sup>17,18</sup>.

Managing a pregnant patient during craniotomy requires thorough understanding of physiology and pharmacology during pregnancy and a comprehensive knowledge of neurosurgical anesthesia to support practice<sup>3,9,19</sup>. The combination of pregnancy and neurosurgery requires rapid but smooth induction as advocated for all pregnant patients beyond 20 weeks of gestation. In pregnancy, functional residual capacity is decreased by 20% and O<sub>2</sub> consumption is higher than non-pregnant patients. Hypo- and hypercapnia both reduce uterine blood flow inducing fetal acidosis and myocardial depression. Thereby, we aimed to maintain mild hypocapnia during surgery in order to avoid fetal stress, while avoiding hypoxia and providing normoventilation throughout surgery<sup>10</sup>. Particular attention should be paid to the positioning of parturient, as there is potential risk of aortacaval compression during surgery. The common practice is either to tilt the operation table 20° left laterally or to place a wedge under patient's right hip, or both, to avoid a hypotension that will also affect the fetus<sup>9</sup>.

The traditional drugs of neurosurgical anesthesia

should be reconsidered in a pregnant patient. Opioids are effective and compatible with neurosurgery and obstetrics; where as inhalational anesthetics are favored for uterine relaxation<sup>9</sup>. Since nitrous oxide should be avoided in the first trimester because of its teratogenicity, its aggravating effect on cerebral vasodilatation when used with potent inhalation agents, is another concern throughout whole neurosurgery. In this case, inhalation anesthetics with opioid supplementations were preferred for their predictable effects on fetal well-being. Diuretics and hypotensives should be used attentively because of fetomaternal fluid shift and decrease in uteroplacental perfusion<sup>9</sup>. Steroids are advantageous by reducing cerebral edema and accelerating fetal lung maturation. Teratogenicity

and adverse effects of drugs are another concern for the well-being of the fetus.

We aim to emphasize that a pregnant woman has a risk of every type of neurosurgical pathology, that a non-pregnant woman may face. In addition, pregnancy, itself, may cause neurological disorders to become symptomatic or may aggravate the present symptoms<sup>2,7</sup>. Anesthetists managing patients with both pregnancy and intracranial neoplasm have to base their practice on theoretical knowledge of obstetrics and neurosurgical anesthesia. However, further fetal safety measures such as fetal heart rate monitoring should be utilized whenever feasible in the presence of the fetus as a second patient during all interventions.

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