

Anesthetic Management of Combined Caesarean Section and Clipping of Ruptured Cerebral Aneurysm

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Introduction

Subarachnoid haemorrhage (SAH), due to ruptured cerebral aneurysm during pregnancy, is a rare complication associated with high morbidity and mortality. Its incidence is approximately one in 10,000 pregnancies. Reported maternal mortality rates vary between 30-40%.¹ Foetal mortality has not been well documented, but one survey calculated a death rate of 17%.¹ Both mortality rates were directly related to the mother's initial Hunt and Hess clinical grade.

A sudden onset of headache and neck stiffness at 34th week of gestation is reported. Cerebral angiography showed 6mm aneurysm in mid right anterior inferior cerebellar artery. A combined surgical procedure; Caesarean section followed by clipping of the aneurysm was performed with good maternal and foetal outcome. The anesthetic concerns and techniques; the timing of neurosurgery; postoperative monitoring and care are discussed.

Case Report

A 27 year old, gravida 6, Para 2+3, 34 weeks pregnant female presented with one day history of headache, neck stiffness, vertigo and projectile vomiting. She had an episode of headache one month back which settled on medications. She had mild pregnancy induced hypertension and an episode of dyspnoea in 2nd trimester of her previous pregnancy. She was allergic to sulphur group of drugs.

Her vitals at the time of admission were: blood pressure 125/70 mmHg, pulse 90/min, temp afebrile and respiratory rate 16/min. Neurological examination was normal except for neck stiffness. Computerized tomography (C.T.) of head showed minimal subarachnoid haemorrhage in fourth ventricle. M.R.I showed high suspicion of tiny aneurysms arising from the peripheral portion of right anterior inferior cerebellar artery. Angiography

showed 6mm aneurysm in mid right anterior inferior cerebellar artery. All the other laboratory investigations were normal.

In view of her pregnancy and a leaking cerebral aneurysm, Caesarean section immediately followed by clipping of the leaking aneurysm was planned under general anaesthesia.

The patient was premedicated with injection metaclopramide 10mg, injection ranitidine 50mg, intravenously and 30 ml 0.3M sodium citrate orally. After a left lateral tilt position, right radial artery was cannulated for continuous arterial blood pressure monitoring under local anaesthesia. After preoxygenation, a rapid sequence induction technique was used with cricoid pressure using fentanyl 2 ug/kg, propofol 2 mg/kg and rocuronium 1 mg/kg. Anaesthesia was maintained with Isoflurane 0.6-1 % in 50:50 mixture of O₂ and N₂O. Ventilation was adjusted to maintain ET-CO₂ between 30-34 mmHg. A 1.9kg boy was delivered after 10 minutes of induction. Baby was initially intubated, injection naloxone was given intramuscularly and after establishing a regular pattern of breathing, was then extubated and shifted to Neonatal Intensive Care Unit. Apgar scores was 2 at 1 minute and 9 at 5 minutes. After the delivery of the baby, during cesarean section a central venous catheter was put in through the left basilic vein.

Patient was turned to lateral position for craniotomy. The anaesthetic management for clipping of cerebral aneurysm included intraoperative management of blood pressure by combination technique in which Nitroglycerine infusion 1-2 ug/kg/min, sodium nitroprusside infusion 1-2 ug/kg/min, IV Metoprolol (incremental doses as per requirement) were given. Fentanyl 50 ug IV stat every half an hour was used for analgesia as well as for controlling hemodynamics. Single IV bolus dose of thiopentone sodium 125 mg at the time of clipping of aneurysm was also administered for cerebral

protection. Mannitol (20%) 250 ml was used on the request of the neurosurgeon.

Intravenous fluid management was done with isotonic saline (0.9%NS). A total of 4.5 liters NS was infused over approximately 5 hours duration. Estimated intraoperative blood loss was 700mls (600mls during Caesarean section plus 100mls during clipping of aneurysm). Total urine output was 1490ml.

At the end of the surgery, neuromuscular blockade was reversed with neostigmine and glycopyrrolate, and patient was extubated when she responded to verbal command.

Patient was transferred to ICU where she remained haemodynamically stable and after 48 hours was shifted to the ward and later discharged home on 7th postoperative day.

Discussion

Aneurysmal subarachnoid hemorrhage (SAH) is rare during pregnancy, therefore anaesthesiologists do not commonly encounter this pathology even in large obstetric and neurosurgical units.

The severity of the presenting symptoms of SAH depends on the localization and extent of the haemorrhage. The most common differential diagnoses are ruptured aneurysm or arteriovenous malformation (AVM), eclampsia, systemic coagulopathies, trauma and intracranial tumours. Other clinical conditions like intracranial venous or dural sinus thrombosis, intracranial arterial occlusion, pituitary apoplexy and epilepsy have similar presenting signs and should be excluded.²

There is a general consensus that the therapeutic management of SAH in a pregnant patient should be identical to that in the non pregnant patient. The optimal timing of clipping of the ruptured aneurysm is still debated in the literature. The international cooperative aneurysm surgery study presented in 1990 observed no significant difference in the outcome between early and late surgery.³ Recent report indicates that patients with Hunt and Hess classification I - III should have surgery during the first 72 hours after SAH.⁴ This approach offers the advantage of preventing and better management of complicating vasospasm and reducing the incidence of rebleeding.⁵ The risk of recurrent SAH after 48 hours is particularly high, 6-8%, with the rate of 1.5% per day for the rest of the initial two weeks.⁵ The timing of surgery is less clear for grades IV-V. Most of the patients need invasive treatment like artificial ventilation, ventriculostomy for CSF drainage and triple H therapy (moderate hypervolemia, hemodilution, mild to moderate

hypertension).⁶

Anaesthesia for combined procedure such as in this patient necessitates specific considerations. As the pregnant patient in the third trimester is considered to have a "full stomach", rapid sequence induction and tracheal intubation are desired techniques to prevent pulmonary aspiration. This type of induction is usually associated with intense sympathetic stimulation, which must be blunted in the appropriate way to limit uterine vasoconstriction impairing uteroplacental blood flow and at the same time avoid increase in systemic blood pressure, which can lead to disastrous complications with a high risk of intraoperative rupture of aneurysm.

Labetalol, sodium nitroprusside and fentanyl (1 ug/kg) have been used to blunt the laryngoscopy and intubation response during rapid induction sequence without significant effect on ICP, uterine blood flow and neonatal depression.¹ Propofol is an appropriate induction agent as it attenuates the laryngoscopic and intubation response better than thiopentone.⁷ Succinylcholine remains the muscle relaxant of choice because of the quickest onset of action. As an alternative rocuronium, which is devoid of side effects associated with succinylcholine is also recommended at doses 0.9-1.2mg/kg.⁸ Profound hyperventilation (ETCO₂ <25 mmHg) should be avoided because, this commonly used technique of hyperventilating the patient with intracranial pathology may not be suitable for a full term pregnant patient as it reduces uterine blood flow with risk of fetal acidosis, hypoxia and low Apgar score.⁹

The fundamental principles of perioperative anaesthetic management, in order to prevent or reduce morbidity and mortality of both mother and foetus should include: rapid establishment of a protected airway; adequate control of blood pressure during induction of anaesthesia with drugs that minimally interfere with ICP regulation and uterine perfusion; avoidance of hypo or hyperventilation and a special neonatal care unit.

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