



ORIGINAL RESEARCH PAPER

Neurosurgery

NEUROSURGERY IN PREGNANCY – OUR EXPERIENCE

KEY WORDS: pelvis, sexual dimorphism, sciatic tubercle.

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ABSTRACT Pregnant patients rarely present with neurosurgical emergencies, but can cause significant morbidity and mortality to the mother and the foetus. Physiological changes of pregnancy in relevance to neurosurgery, effects of anaesthetic agents on the foetus, time of presentation of the problem in accordance with the gestational age add to the complexity in decision making in managing the patient. Urgent neurosurgical intervention in pregnancy is reserved for the management of malignancies, acute hydrocephalus, and benign brain tumors associated with signs of impending herniation or progressive neurological deficit. Here in this paper we illustrate our experience at our institution in treating three patients in their third trimester presenting with neurosurgical problems during the years 2014-2016. First one, a case of headache and altered sensorium during third trimester of pregnancy, found to be right parieto-occipital meningioma on evaluation, managed with right parieto-occipital parasagittal craniotomy and total excision, Second, a case of antenatal seizures who on evaluation revealed left parietal lobe abscess, managed successfully with left parieto-occipital craniotomy and excision of abscess cavity, the third one, a case of headache and projectile vomiting, evaluation revealed right cerebellar hemangioblastoma, treated with vp shunt, followed later by suboccipital craniectomy – excision. All the three patients have been attended with meticulous neurosurgical and obstetric care on the same sitting.

Background

During pregnancy, the reasons for non-obstetric surgery are not new and has been reported for various conditions with a frequency of 0.2–0.8%. with the advances in the anesthesia and surgical care, it can be performed without increased risk to the fetus or the mother. But, brain tumors in a pregnant patient are extremely rare unfortunate scenarios, with an estimated incidence of about five cases per 1 million pregnancies. They can pose serious challenges to the neurosurgeon, obstetrician, anesthetist and pediatrician in balancing the act of treating mother and child

The overall incidence of intracranial neoplasm is almost equal to that in non-pregnant women of childbearing age, and was estimated for meningiomas to be about 1 to 5/100,000 females aged 15–45 years. But in some tumors, especially meningiomas, symptoms may flare up due to metabolic and hemodynamic changes during pregnancy, causing a rapid increase in the size and hence the symptoms. Bernard in 1898 made the first such observation in a case of connective tissue tumor growing rapidly during pregnancy, but it took nearly more than half a century until this specific correlation was recognized for intracranial meningiomas,

There are only a few case reports or small series on the topic available, but the overall lesson learned from these cases is that signs and symptoms can be significantly aggravated antepartum or post-partum and may mimic more common conditions such as hyperemesis gravidarum, eclampsia or puerperal psychosis due to either maternal metabolic changes causing fluid retention, vascular engorgement and edema or accelerated tumor growth due to hormonal receptor expression. Triage in such cases needs to be individualized and based on very thorough observation of the clinical setting of such patients.

In this particular paper, we illustrate three such antenatal cases complicated with neurosurgical issues and so, with associated difficulties in decision-making. The team effort contributed to the successful management of intracranial pathologies complicated by pregnancy.

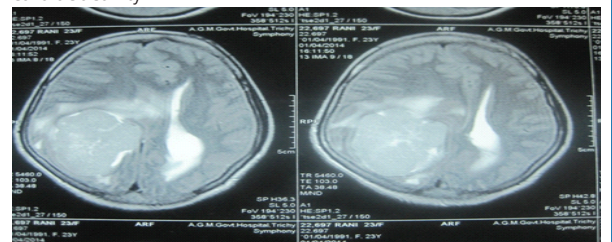
Objective:

To illustrate the three pregnancy complicated neurosurgical cases managed at our institution, in the lines of, how they presented, at what phase of the antenatal period they presented, how the disease progressed in the antenatal period, dilemmas in decision making, combined multispeciality team effort in saving the lives of mothers and neonates.

Case illustrations:

Case no.1:

A 29-year-old right-handed female, who was on ninth month of amenorrhea (gravida 2, para 1), presented with intractable headache then for three weeks and declined mental status for one day. According to the patient’s relatives, she complained of constant bifrontal headaches for three weeks prior to admission. For 2 days prior to admission, headache increased in severity and she developed nausea and vomiting, becoming very lethargic, and developed altered sensorium. There was nothing relevant in the past medical history and past surgical history revealed nothing other than previous caesarean section. Ultrasound examination had documented an uncomplicated pregnancy two weeks back, with gestational age corresponding to 32 weeks with good fetal cardiac activity.



Hospital Course:

The patient presented afebrile, with normal vital signs. The general exam was unremarkable. The neurological exam revealed the patient was drowsy, and was able to follow simple oral commands. There was an unremarkable cranial nerve exam, with brisk pupillary reactions to light and accommodation. Fundoscopic examination revealed early papilledema.

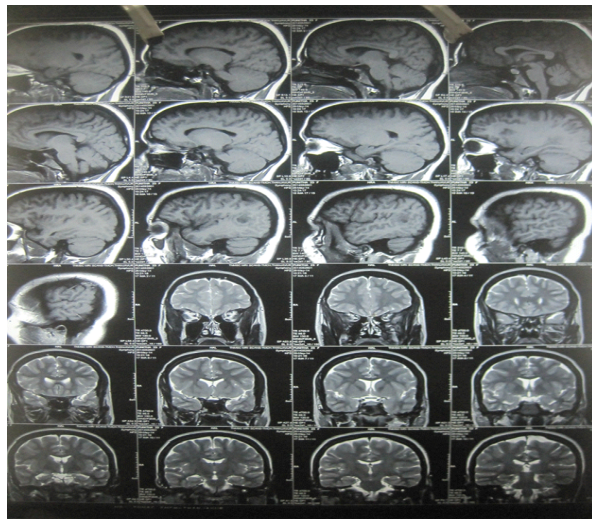
The patient was admitted and monitored until imaging could be completed for further assessment. Although magnetic resonance imaging (MRI) is the method of choice for the work-up, it remains suboptimal secondary to the inability to use contrast agents during pregnancy. We obtained a baseline MRI study. It revealed a right parieto occipital extra-axial space occupying lesion with mass effect. An obstetric consult revealed an uncomplicated pregnancy with unremarkable characteristics by fetal monitoring. The repeated ultrasound revealed 34 weeks gestations. An urgent interdisciplinary discussion was called to arrive at a balanced clinical judgement that must weigh a decision to resect the lesion during pregnancy vs. waiting until post-partum if deemed possible.

On the same night the patient deteriorated and became unconscious, motor examination revealing ability to localize the painful stimulus, with left hemiparesis, with pupils revealing anisocoria. Patient has been taken for emergency decompression along with emergency caesarean section under general anesthesia. Because brain surgery may induce labour, or lead to fetal complications intraoperatively, the consensus was in favor of taking care of the baby first. An alive male child was delivered with 2.4 kgs and it cried immediately after birth. Baby has been taken care by the duty neonatologist under neonatal intensive care monitoring unit.

Then the patient was positioned supine in a Mayfield headrest and she was placed in slight reverse Trendelenburg. She received 100 g of mannitol, 20 mg of Lasix and 10 mg of decadron and was hyperventilated to an arterial partial pressure of carbon dioxide of <30, Cranial surgery was proceeded with emergency right parieto occipital parasagittal craniotomy, which revealed a tense, non pulsating brain with severe edema. Lesion excised in piecemeal to achieve gross total excision under operating microscope. Tumour was found extra-axial, firm in consistency with moderate vascularity. Meticulous hemostasis achieved after excision and wound closed. Patient was reversed from anesthesia and extubated. 12 hrs post surgery patient became fully conscious with mild paucity of movements in the left upper and lower limbs. post operative CT revealed complete excision of the lesion. Histopathological examination revealed the lesion as Transitional meningioma. Patient had an uneventful postoperative course and the baby was handed over to the mother on the first post operative day. Breastfeeding has been deferred in view of post operative anti epileptic usage by the mother.

Case no.2:

A 23 years old primi presented with headache then for 2 days and one episode of seizure. That was a new onset, tonic clonic seizure, associated with spontaneous urination. Patient presented to the obstetric casualty in the post ictal state.



Hospital Course:

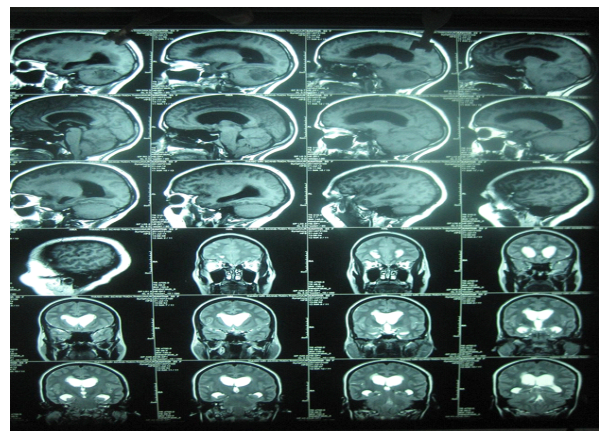
Half an hour after admission and early resuscitation, patient improved and emergency sonography revealed a single live fetus at 36 weeks of gestation. Neurology consult was sought, having considered antepartum eclampsia as the cause. During evaluation patient was drowsy, arousable and was obeying simple oral commands with stable vital parameters. Pupils were equal and reacting and fundoscopic examination was normal. MRI brain was ordered to rule out an organic cause. MRI revealed left parieto occipito ring lesion suggestive of a cerebral abscess. Meanwhile the patient had second episode seizure despite on anti epileptics. Emergency neurosurgery consult was sought, and interdisciplinary discussion was conducted on the case. Decision was made to go ahead with elective caesarean section to deliver the baby and to go for cranial surgery in the same sitting. As any further seizure episode could lead to intrauterine fetal demise, surgery was

planned on the same day.

Under General anesthesia, the patient underwent LSCS and delivered an alive male baby weighing 2.7 kgs. Baby was taken care by the team of neonatologists. After LSCS, we proceeded with the cranial surgery. The patient was positioned supine in a Mayfield headrest and she was placed in slight reverse Trendelenburg, with head elevated at 30degrees. She received 150 ml of mannitol, 20 mg of Lasix and 16 mg of dexamethasone and was hyperventilated to an arterial partial pressure of carbon dioxide of <30, a left parieto occipital parasagittal craniotomy was done, which revealed a tense, poorly pulsating brain. Lesion entered and the frank, non odorous pus aspirated, and the abscess wall excised in toto under operating microscope. Hemostasis achieved after excision and wound closed. Pre operative and preoperative intravenous antibiotics were given. Patient was reversed from anesthesia and extubated. Post surgery patient became conscious with no significant neurological deficit. Post operative CT revealed complete excision of the lesion, with minimal operative site edema. Histopathological examination revealed the lesion as inflammatory lesion suggestive of an abscess. Patient had an uneventful postoperative course with no episodes of post operative seizure.

Case no: 3

38 years old female patient, who was on gravida Gravidia2 Para1 Live1 at 7 months of gestation, presented at obstetric casualty with history of headache for two weeks, vomiting for two days. There was no history of seizure.



Hospital Course:

On reception, patient was stable, with normal blood and urine biochemical parameters, and stable vitals. Patient was admitted, obstetric evaluation with sonography done which revealed a single live fetus in 30 weeks of gestation. Patient had increasing headache over the next two weeks, during which a neurosurgery consult was sought. Patient on evaluation was conscious, oriented, with no neurological deficits. MRI study was done, which revealed a posterior fossa space occupying lesion in the right cerebellum, imposing mass effect with resultant narrowing of fourth ventricle causing mild ventriculomegaly of the lateral and third ventricles. As the patient was on 30 weeks of gestation, the case was discussed in the interdisciplinary meeting and consensus decision was taken. We decided to wait till the fetal maturity is achieved i.e., atleast upto 34 weeks of gestation and to consider the patient for LSCS along with cranial surgery in the same sitting.

Two weeks later patient worsened with increasing headache and vomiting. Follow up imaging showed ventriculomegaly increased in size with fundoscopic examination revealing bilateral papilloedema. Patient underwent emergency left sided ventriculoperitoneal shunting. Patient showed improvement in symptoms after shunting. Patient remained admitted in the hospital under intense neuro and obstetric monitoring. At 36 weeks, sonography was repeated which revealed healthy live fetus. Patient was taken for LSCS and delivered an alive male child weighing 2.9 kgs. Patient was placed in prone position then and she underwent suboccipital craniectomy with gross total excision

of the lesion. Post operative period was uneventful. Histopathological examination of the lesion revealed Hemangioblastoma- reticular variant. Patient recovered without any neurological deficit.

DISCUSSION:

The management of brain tumors occurring during pregnancy need to be guided by the firm principle of "nihil nocere" (do not do anything that can cause harm) and has to emphasize safety of both the mother and the fetus as the primary goal of treatment. Some patients can be managed conservatively antepartum, but urgent intervention may be required in cases of (1) malignancies, (2) hydrocephalus and (3) relatively benign neoplasm that shows growth and progressive signs and symptoms of mass effect leading to neurological deficit and even incipient herniation, Meningiomas are a rather frequently encountered neoplasm in neurosurgical practice. These tumors arise from the arachnoid cells and account for 10–20% of the brain tumors seen in a general neurosurgical oncology population and may also rarely occur extradurally or even extracranially.

Meningiomas variably express hormone receptors for progesterone, androgen, estrogen and placenta growth factor, as well as exogenous hormones, and their response to increased serum progesterone levels during the second half of pregnancy may account for accelerated growth. This explains the sudden presentation as a neurosurgical emergency in some circumstances. However, not all meningiomas are equal and data from the literature indicates that the clear cell meningioma encountered in our patient is exceedingly rare. Positive sex hormone receptor status for progesterone in conjunction with an increased MIB proliferation index reflects a prognosis for the patient with increased recurrence rates. During the third trimester, up-front delivery of a viable fetus is the first choice to keep the risk of maternal death not higher than in non-pregnant females undergoing such surgery.

Cerebral abscess is a life threatening condition rarely associated with pregnancy. Predisposing factors include infection, foreign bodies and immunosuppression. Headache is present in 75%, focal neurological deficit in 67% and seizures in 17%. Mortality occurs in about 12% of alert patients, 60% in patients with herniation and about 90% in comatose. Serious attention in the management is crucial in saving the lives.

Symptomatic hemangioblastoma of the posterior cranial fossa presenting during the pregnancy is very rare. Very few isolated cases of neurosurgical intervention with good outcome are reported in literature. During pregnancy the maternal plasma volume increases from the six week of gestation to the peak volume of 3500 ml by the 32–34 weeks. Several metabolic and hemodynamic changes associated with pregnancy may in fact also may be collectively responsible for enlargement and increased vascularity hemangioblastoma. the increased vascularity of these tumors, causes compression and distortion of cerebellar hemisphere and brainstem with obstruction along the CSF pathway.

Frantzen et al. analyzed the effect of pregnancy on von Hippel-Lindau in a total of 29 cases and observed progression score of cerebellar hemangioblastomas was significantly after pregnancy in about 40% cases in their study and eventually concluded pregnancy accelerates the increase in the size of cerebellar hemangioblastoma progression and causes a high pregnancy complication rate. The symptomatic hemangioblastoma during pregnancy can be safely operated, if associated with failure of conservative management or not responding with diversion procedure or showing progressive worsening of neurological deficit.

In our cases, the interdisciplinary management of the scenarios proved to be exceptionally suited to manage our maternal patients well, that both the cranial surgeries as well as the caesareans were performed in the same sitting in all the three cases. All the three patients recovered and returned to a functionally active life with

their newborn infants being handed over in a healthy state after the initial intensive care.

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