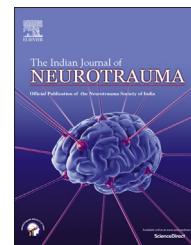


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Case Report

Decompressive craniectomy in term pregnancy with combined caesarean section for traumatic brain injury



Pankaj Dawar^a, M.S. Aradhana Kalra^b, Deepak Agrawal^{c,*},
Bhawani S. Sharma^d

^aSenior Resident, Department of Neurosurgery, All India Institute of Medical Sciences and Associated Jai Prakash Narayan Apex Trauma Centre, New Delhi, India

^bSenior Resident, Department of Obstetrics and Gynecology, Deen Dayal Upadhyay Hospital, New Delhi, India

^cAssociate Professor, Department of Neurosurgery, All India Institute of Medical Sciences and Associated Jai Prakash Narayan Apex Trauma Centre, New Delhi, India

^dProfessor and Head of Department, Department of Neurosurgery, All India Institute of Medical Sciences and Associated Jai Prakash Narayan Apex Trauma Centre, New Delhi, India

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ABSTRACT

Over the years the maternal mortality depending on the obstetric causes has reduced whereas there is a relative increase in maternal mortality and morbidity due to non-obstetric causes. Trauma during pregnancy, including head injury, is one of the leading causes of incidental maternal death and morbidity, and complicates 6%–7% of all pregnancies. Furthermore it predisposes two lives at risk and creates unique diagnostic and therapeutic challenges. Because of the physiological hormonal, hemodynamic and anatomical changes associated with pregnancy, certain standard neurosurgical practices may be challenged. We present a case of woman with term pregnancy who sustained moderate head injury requiring urgent caesarean section for pregnancy and decompressive craniectomy in the same sitting in Operation Theater. Issues like screening of mother and fetomaternal monitoring; physiological changes during pregnancy, choice of anaesthesia, intraoperative concerns and fetal monitoring, timing of delivery are discussed with review of pertinent literature.

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1. Introduction

Trauma during pregnancy is currently a leading cause of non-pregnancy related maternal death which itself is the most common cause of fetal demise.¹ The most common causes of trauma in pregnancy include road-traffic-accidents (RTA), fall

from height, physical assaults, and burns.² Women in their reproductive age are among the population at greatest risk for trauma. Over the years the maternal mortality depending on the obstetric causes has declined whereas there is a relative increase in maternal mortality and morbidity due to non-obstetric causes. Trauma during pregnancy, including head

* Corresponding author.

E-mail addresses: ved@vsnl.com, drdeepak@gmail.com (D. Agrawal).

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injury, is one of the leading causes of incidental maternal death and morbidity, and complicates 6%–7% of all pregnancies.³ Furthermore it predisposes two lives at risk and creates distinct diagnostic and therapeutic challenges.

We present here a case of moderate head injury with left frontal hemorrhagic contusion with left fronto-temporo-parietal acute subdural hemorrhage necessitating urgent surgical evacuation in a lady with term pregnancy. Both caesarean section and craniotomy were performed simultaneously. We felt that both the procedures were feasible simultaneously and facilitated the best outcome for both mother and baby.

2. Case report

The patient was 26-year-old pregnant woman at 36 weeks gestation who was a pillion rider on a two wheeler which sustained head on collision with a car at a high speed. She was not wearing helmet at that time. Her Glasgow Coma Score (GCS) was 11 (E3V3M5) at the accident scene and her left pupil was dilated and nonreactive to light. She also sustained facio-maxillary injuries and her airway was threatened. She was immediately taken to some local hospital where her oxygen saturation was 78% on room air. She was immediately intubated and hemodynamically stabilized and then shifted to our centre. This was her first pregnancy which had been uncomplicated till date.

She arrived at our ED (emergency department) nearly 8 h after the injury. In our ED she was found to have GCS 8 (E3V^{ET}M5) with endotracheal tube in situ, pulse 90/min, blood pressure 96/66 mmHg, multiple facial and chest lacerations and abrasions, left pupil dilated and nonreactive to light. Regular uterine contractions of 4 in 10 minutely were noted

during palpation of uterus. There was no vaginal bleeding. FAST (focused abdominal sonography for trauma) was negative except for positive finding of gravid uterus. Computed tomography (CT) scan revealed an acute left fronto-temporo-parietal subdural hemorrhage with left frontal contusion with midline shift of 5 mm and effaced sulci and left lateral ventricle (Fig. 1).

Immediately obstetrics consultation was sought and our team consisting of neurosurgeon, obstetrician and anesthetist thoroughly discussed the situation with the patient's family who requested that every possible intervention be attempted in the hope of survival and improvement for both the patient and fetus. The patient was immediately taken to operation theatre whereafter induction of general anesthesia, urgent caesarean section was performed and in the meantime her head was clipped off hair, washed and positioned on horse shoe. The caesarean section got finished in 30 min time and a live baby boy with birth weight of 2980 g was delivered with Apgar score of 6 at 1 min and 9 at 5 min. The baby on delivery was resuscitated and shifted to neonatal intensive care unit. There was no retroplacental clot evident at closure and meticulous hemostasis was done with no oozing from placental surface. By this time the patient head was painted with ether and povidone iodine and draped. She underwent left fronto-temporo-parietal decompressive craniectomy, evacuation of subdural hematoma and contusectomy and lax duraplasty with pericranial graft. Her bone was kept in bone bank. Following this the facial lacerations were debrided and sutured. Post op she was shifted to our dedicated neurosurgery intensive care unit intubated and unreversed with stable vitals.

On reversal from general anesthesia she remained E2V^{ET}M5 for two days and started obeying commands on third

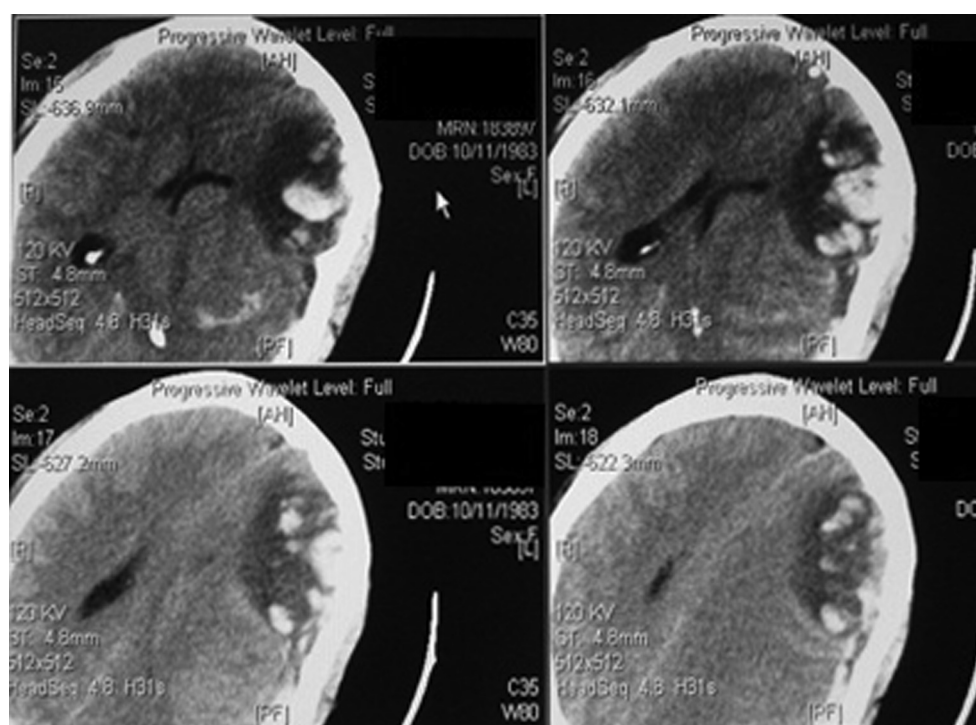


Fig. 1 – NCCT head of patient showing left frontal contusions.

day. She was extubated on post op day four (POD 4), and she was maintaining adequate saturation of oxygen on room air and shifted to ward on day five. She was discharged on day ten with stable vitals, moving all four limbs with GCS of E4V5M6. At one year follow up both the mother and baby were doing well with no neurological deficits.

3. Discussion

With advances in technology and medical care the obstetric causes of maternal mortality have declined, however non-obstetric causes of maternal morbidity and mortality have increased. Trauma during pregnancy is presently a leading non-obstetric cause of maternal death, which in itself is the most common cause of fetal demise.¹ The pregnant trauma victim presents a distinctive spectrum of challenges to the trauma health care team. The fact that pregnancy may not always be known to be present to the health care team (at the scene of road traffic accidents, in the emergency room, or in the operating room) additionally complicates the situation. Pregnancy must always be suspected (until proven otherwise) in any female trauma patient of child bearing age,⁴ and must be excluded by doing urine pregnancy test of all trauma female patients of child bearing age.⁵ At our centre we routinely do urine pregnancy test of all female trauma victims of child bearing age.

It is an accepted practice that the priority in the management of a pregnant patient sustaining major trauma must always be early aggressive maternal stabilization because effective maternal resuscitation also provides fetal resuscitation. However, in third-trimester pregnancy if the prognosis of maternal survival is poor, caesarean section takes precedent.⁶ Pregnant patients with severe head injuries are at increased risk of fetal death.⁶ Early recognition of fetal compromise is therefore important in this group of patients. Up to 60% of fetal deaths resulted from delayed recognition of fetal distress and delayed caesarean section.⁷ All pregnant trauma patients should have their fetus monitored from the time of injury and continued for an appropriate interval until the danger has passed.⁶

If the mother's condition is stable, the status of the fetus and the extent of uterine injury determine further management. A potentially viable fetus that shows no signs of distress should be monitored by external ultrasonography or fetal heart rate monitoring frequently. Since premature labor is always a possibility in these patients, an external to cotransducer should be used to detect the onset of uterine contractions. If premature labor ensues, tocolytic therapy may be initiated. When a viable fetus shows signs of distress, despite successful resuscitative measures, a caesarean delivery must be performed expeditiously. A nonviable fetus may be managed conservatively in utero to optimize maternal oxygenation and circulation. If the fetus is viable at the time of urgent neurosurgery, a decision must also be made for the appropriate time and method of delivery. Placental abruption complicates 1–5% of minor injuries and 20–50% of major injuries.^{8,9} Except for maternal death, placental abruption is the most frequent cause of maternal death after trauma. Fetal death, resulting from injuries to the obstetric patient is most commonly associated with placental abruption.⁸ In our case,

there were four contractions in every 10 min when the patient was assessed some 8–9 h after the injury. The lack of vaginal bleeding did not exclude placental abruption.⁹

When neurosurgery is indicated urgently during pregnancy, General anesthesia will almost always be indicated. During neurosurgery, osmotic diuresis, controlled hypotension, hypothermia, and hypocarbia are commonly induced to decline the intracranial pressure (ICP). In the pregnant patients, these may adversely affect the fetus. For third trimester gestations, the patient may be suitable for initial cesarean delivery, followed by the neurosurgical procedure, using an appropriately modified anesthetic technique.⁴ Postpartum hemorrhage from uterine atony remains a risk during the subsequent neurosurgery warranting continuous infusion of an oxytocic drug.¹⁰ There seems to be no ideal "best" way of perioperative management of the head-injured pregnant trauma victim and involves consideration of several confronting issues.⁴ Positioning needs head elevation for the neurosurgery, whereas a lateral tilt is required for the avoidance of aortocaval compression and reduced venous return. If preceded by vaginal or caesarean delivery prolonged supine positioning may facilitate neurosurgery. Airway management must address the risks of possible cervical trauma, avoidance of increases in intracranial pressure; the presence of a potentially full stomach, pregnancy induced changes to the airway and enlarged breasts which increase the incidence of a difficult intubation.¹¹ A rapid sequence induction with cricoid pressure is advocated despite airway management being more difficult.

Postoperative management of pregnant patients after a neurosurgical intervention is not so much different than that of nonpregnant. Extubation should be delayed until the patient is sufficiently awake to protect her airway from regurgitation and aspiration.

A pregnant woman is no more predisposed to head injury than a non-pregnant one. However, because of the physiological hormonal, hemodynamic and anatomical changes associated with pregnancy, certain standard neurosurgical practices may be challenged. There is no Class 1 or class 2 level evidence existing to guide management, and practice is mainly dependent on case reports and inherited wisdom. Thus, close communication and constant discussion between the neurosurgeon, neuroanaesthetist, obstetrician and the patient's family is essential. Care of the pregnant neurosurgical patient in essence follows the general principles of obstetrics and neurosurgery, with a few specific considerations. Above all, it is a challenge in team work and communication between all parties concerned in the patient's care.

In our case, the successful outcome for both mother and child was because of a multidisciplinary team approach. There was obvious need for evacuating the subdural hematoma yet immediate caesarean section was required for a compromised fetus. Practically and logistically, the two simultaneous operations ran adeptly and one did not have a bearing upon the other.

4. Conclusions

The pregnant trauma patient necessitates care to be provided for two patients simultaneously and pose a distinct spectrum

of diagnostic and therapeutic challenges. Neurosurgery is seldom required during pregnancy but mandates a multidisciplinary team approach and cautious contemplation of the timing of both surgery and delivery when warranted. We advocate simultaneous craniotomy and caesarean section in the pregnant patient with moderate to severe head injuries with gestational age of viability consistent with locality. Both procedures are realistic simultaneously and aided a better outcome for both mother and baby.

Conflicts of interest

All authors have none to declare.

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