Maternal Persistent Vegetative State with Successful Fetal Outcome

A woman suffered from massive blunt injuries in a motor vehicle accident at a presumed 4 weeks' gestation, but she successfully carried the fetus for an additional 29 weeks. Premature labor began at 33 weeks’ gestation and a live 1,890 g male was delivered. His development was normal for the 12-months postnatal follow-up period. The patient remained in a persistent vegetative state. Only 12 cases of severely brain-injured pregnant patients who delivered babies have been reported in English literature. Such patients need special maternal and fetal monitoring. As shown in our patient, successful fetal outcome could be obtained in a mother who suffered from hypovolemic shock and diffuse axonal injury, was treated with numerous medications from 4 weeks’ gestation, and survived premature labor at 33 weeks' gestation in a persistent vegetative state. This report represents the longest interval from maternal vegetative state to obstetric delivery. From our case, it would seem that no clear limit exists that restricts the physician's ability to support a severely injured pregnant patient.

Key Words: Persistent Vegetative State; Delivery; Fetal Outcome

INTRODUCTION

Severe trauma in a pregnant patient is relatively rare but is truly an injury of double magnitude. While being cognizant of the fetus and its well-being, all expediency must be employed to accomplish a thorough evaluation of the severely injured mother and allow for the prompt employment of appropriate therapeutic measures. Few cases have been reported to evaluate the rate at which intensive-care support of the brain-dead or vegetative-state mother delivers a healthy newborn. To our knowledge, there are only 12 reports of severely injured patients who delivered babies in the literature (1-12). This case demonstrates a fetus can develop normally in a mother with anemia, hypoxia, treatment with numerous medications from 4 weeks' gestation, and a mother who survives premature labor at 33 weeks' gestation in a persistent vegetative state. The patient’s nutritional and physical state remained relatively good during the period of intensive care. A brain MR image at 3 months after the accident revealed encephalomalacic cavities in the corpus callosum, brainstem, left basal ganglia, and right frontotemporal areas with passive dilatation of the left ventricle (Fig. 1).

One-hundred-fourteen days after the accident, the patient was noticed to be pregnant by a urinary pregnancy test. Ultrasound evaluation revealed a fetus at 20 weeks and 1 day of gestation with normal cardiac activity and fetal movement. Chromosome study was normal. At 33 weeks' gestation, because of premature rupture of the membranes, uterine contractions, and a previous history of cesarean section, a repeated section was performed under general anesthesia. A 1,890 g male infant was born with Apgar scores of 6 and 8 at one minute and five minutes, respectively. The baby was cared for in the neonatal intensive care unit, where mild respiratory distress syndrome developed. However, he generally did well. On follow-up examination at 12 months of age, of diffuse axonal injury. Subsequent orthopedic surgery was performed for the right Colles’ and malleus fractures with a tracheotomy for mechanical ventilation.

CASE REPORT

A previously healthy 22-yr-old woman (gravida 2, para 1) with unknown last menstrual period, suffered massive blunt trauma in a motor vehicle accident. She was referred to the regional hospital in a profound comatose state for emergency exploratory abdominal surgery to manage splenic rupture and liver laceration with massive hemoperitoneum. The estimated blood loss was 1,500 mL. Brain CT revealed the left basal ganglia hemorrhage and brain edema suggestive
he was found to be growing and developing normally. The mother remained in a persistent vegetative state after the delivery.

**DISCUSSION**

Traumatic injury occurs in 6 to 7% of pregnancies, with hospitalization for the trauma occurring in 0.4% of pregnancies (13). The effect of trauma on pregnancy depends on the gestational age, intensity of maternal-fetal aggression, and type and severity of the injury. Rogers et al., in a multi-institutional study of trauma during pregnancy, detected 3.8% of maternal mortality rate and 9.4% of fetal mortality rate (14). Motor vehicle accidents, falls, and assaults account for the most frequently cited causes of injury during pregnancy (15). These data may be related to the fact that more women are working and participating in a full schedule of activities during pregnancy. Severe trauma to an obstetric patient is truly an injury of double magnitude. Dramatic physiologic and chemical changes occur during gestation (16). Mother and fetus have different responses to pathologic events, and the basis of these changes must be kept in mind as therapy is initiated. One of the major concerns in the management of the injured pregnant woman is the effect of the injury and its sequelae on the fetus. Despite the fetus being a second potential victim, vigorous maternal resuscitation is the first priority and ultimately results in the best fetal out-

![Fig. 1. Sagittal T1-weighted (A) and axial gradient echo MR images (B & C) reveal the prominent signal changes typical of diffuse axonal injury in the corpus callosum, midbrain, basal ganglia, and right temporal and frontal lobes.](image-url)
Maternal Vegetative State and Fetal Survival

During initial therapy of the severely injured gravid patient, circulation must be supported with crystalloid infusion or colloid as initially mandated by the maternal condition. Because of natural maternal hypervolemia, clinical shock in the field may not become manifest until there has been a 30% loss of maternal blood volume. After 20 weeks gestation, continuous uterine displacement (15-degree left lateral tilt) is desirable to prevent compression of the inferior vena cava from an enlarged uterus (16-18). Diagnostic radiologic studies should be performed as necessary for complete maternal assessment. Prolonged pregnancy. While real-time ultrasound forms the basis for the assessment of the fetal well-being, other techniques also contribute, including electronic fetal monitoring, direct fetoscopy, rapid biochemical and karyotyping studies of amniotic fluid, fetal blood sampling, chorionic villus biopsy, computed tomography, and magnetic resonance imaging. If the pregnancy is continued, then there is the question of whether to perform early cesarean or induced vaginal delivery or whether to allow the fetus to be carried to term. Usually, the fetal benefits, measured in the chance for good-quality survival, must be weighed against the risks to the mother of operative delivery. Cesarean section should be reserved for the numerous complications resulting from serious maternal injury during pregnancy such as fetal distress, placental abruption, uterine rupture, preterm labor and fetal malpresentation in labor. Cesarean delivery even in the best of circumstances is not likely to result in a surviving infant prior to 24 weeks’ gestation. Survival is expected to be greater than 50%, however, when the pregnancy has achieved 26 weeks’ gestation (16). Postmortem cesarean section is indicated in cases of recent maternal death or brain death. Based on material published from 1900, cesarean delivery should begin within 4-5 min of a maternal death (16, 18). If a cardiac arrest has occurred from a reversible cause, there may be benefit to the mother in accomplishing delivery because of the increased demands on oxygen consumption by the gravid uterus (16, 17). Thus postmortem cesarean delivery may be therapeutic for the mother.

Our patient suffered from blunt multiple trauma in a motor vehicle accident and was referred to the hospital in a profound comatose state. Because of the patient’s initially unstable condition, the tentative diagnosis of pregnancy was not made at the time of admission. Retrospectively, the mother was estimated to be pregnant at 4 weeks’ gestation at the time of accident. She was treated with vigorous diagnostic work-ups and therapies without considering the fetus’s well-being. Her pregnancy was continued for over 29 weeks after the severe brain and abdominal injuries. Eventually, the patient delivered a 1,890 g male infant with Apgar score of 6 and 8 at one minute and five minutes at 33 weeks’ gestation and still remained in a persistent vegetative state. The infant was cared for in the neonatal intensive care unit, where mild respiratory distress syndrome developed. He showed normal development through his first 12 months. Few cases have been reported to evaluate the rate at which intensive-care support of the severely brain injured mother delivers a healthy newborn. There we found only 12 previous reports of pregnant women in a prolonged comatose or vegetative state (1-12). Of those, all mothers delivered viable infants but only four mothers survived. Such patients need special nutrition and maternal and fetal monitoring in an intensive care unit (1-15). As shown in our patient, a successful fetal outcome could be obtained in a mother who suffered from hypovolemic shock, anemia, hypoxia, had operations under general anesthesia, was treated with nu-merous medications from 4 weeks’ gestation, and survived premature labor at 33 weeks’ gestation in a persistent vegetative state. This case represent the longest interval from maternal vegetative state to obstet-
ric delivery. From our case, it would seem that no clear limit exists that restricts the physician’s ability to support the vegetative-state pregnant patient.

REFERENCES

1. Ben Aderet N, Cohen I, Abramowicz JS. Traumatic coma during pregnancy with persistent vegetative state. Case report. Br J Obstet Gyneco 1984; 91: 939-41.
2. Bernstein IM, Watson M, Simmons GM, Catalano PM, Davis G, Collins R. Maternal brain death and prolonged fetal survival. Obstet Gynecol 1989; 74: 434-7.
3. Dillon WP, Lee RV, Tronolone MJ, Buckwald S, Foote RJ. Life support and maternal brain death during pregnancy. JAMA 1982; 248: 1089-91.
4. Field DR, Gates EA, Creasy RK, Jonsen AR, Laros RK Jr. Maternal brain death during pregnancy. Medical and ethical issues. JAMA 1988; 260: 816-22.
5. Heikkinen JE, Rinne RI, Alahuhta SM, Lumme JA, Koivisto ME, Kirkinen PP, Sotaniemi KA, Nuutinen LS, Jarvinen PA. Life support for 10 weeks with successful fetal outcome after fatal maternal brain damage. Br Med J (Clin Res Ed) 1985; 27: 1237-8.
6. Hill LM: Management of maternal vegetative state during pregnancy. Case report. Mayo Clin Proc 1985; 60: 469-72.
7. Landye ST. Successful enteral nutrition support of a pregnant, comatose patient: A case study. J Am Diet Assoc 1988; 88: 718-20.
8. Loewy EH. The pregnant brain death and the fetus: Must we always try to wrest life from death? Am J Obstet Gynecol 1987; 157: 1097-101.
9. Lucas B. Pregnant car-crash victim. Nursing Times 1976; 25: 451-3.
10. Sampson MB, Petersen LP. Post-traumatic coma during pregnancy. Obstet Gynecol 1979; 53: 25-35.
11. Webb GW, Huddleston JF. Management of the pregnant woman who sustains severe brain damage. Clin Perinatol 1996; 23: 453-64.
12. Wong M, Apodaca CC, Markenson MG, Yancey M. Nutrition management in a pregnant comatose patient. Nutr Clin Pract 1997; 12: 63-7.
13. Shah KH, Simons RK, Holbrook T, Fortlage D, Winchell RJ, Hoyt DB. Trauma in pregnancy: maternal and fetal outcomes. J Trauma 1998; 45: 83-6.
14. Rogers FB, Rozycki GS, Osler TM, Sherrick SR, Malbert J, Kirkton O, Scalea T, Morris J, Ross, S, Cipolle M, Filides J, Cogbill T, Bergstein J, Clark D, Frankel H, Bell R, Gens D, Cullinane D, Kauder, D, Boynoe RP. A multi-institutional study of factors associated with fetal death in injured pregnant patients. Arch Surg 1999; 134: 1274-7.
15. Corsi PR, Russlan S, de Oliveria LB, Kronfly FS, Marinho VP. Trauma in pregnant women: analysis of maternal and fetal mortality. Injury Int J Care Injured 1999; 30: 239-43.
16. Lavery JP, Staten-McCormick M. Management of moderate to severe trauma in pregnancy. Obstet Gynecol Clin North Am 1995; 22: 69-90.
17. Pearlman MD, Tintinalli JE. Evaluation and treatment of the gravida and fetus following trauma during pregnancy. Obstet Gynecol Clin North Am 1991; 18: 371-81.
18. Jordan BD. Maternal head trauma during pregnancy. Adv Neurol 1994; 64: 131-8.
19. Luke B. Nutritional influences on fetal growth. Clin Obstet Gynecol 1994; 37: 538-49.