

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 re-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*

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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.

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

of diffuse axonal injury. Subsequent orthopedic surgery was performed for the right Colles' and malleus fractures with a tracheotomy for mechanical ventilation.

Thirty-two days after the accident, the patient was transferred to the intensive care unit of our hospital. The patient was in a vegetative state and had involuntary limb movements and eye openings without any apparent visual following or perception. Prolonged fever, believed to originate in the central nervous system and from recurrent urinary and tracheal infections, was treated with appropriate antibiotics according to the laboratory reports. 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, brain stem, 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,

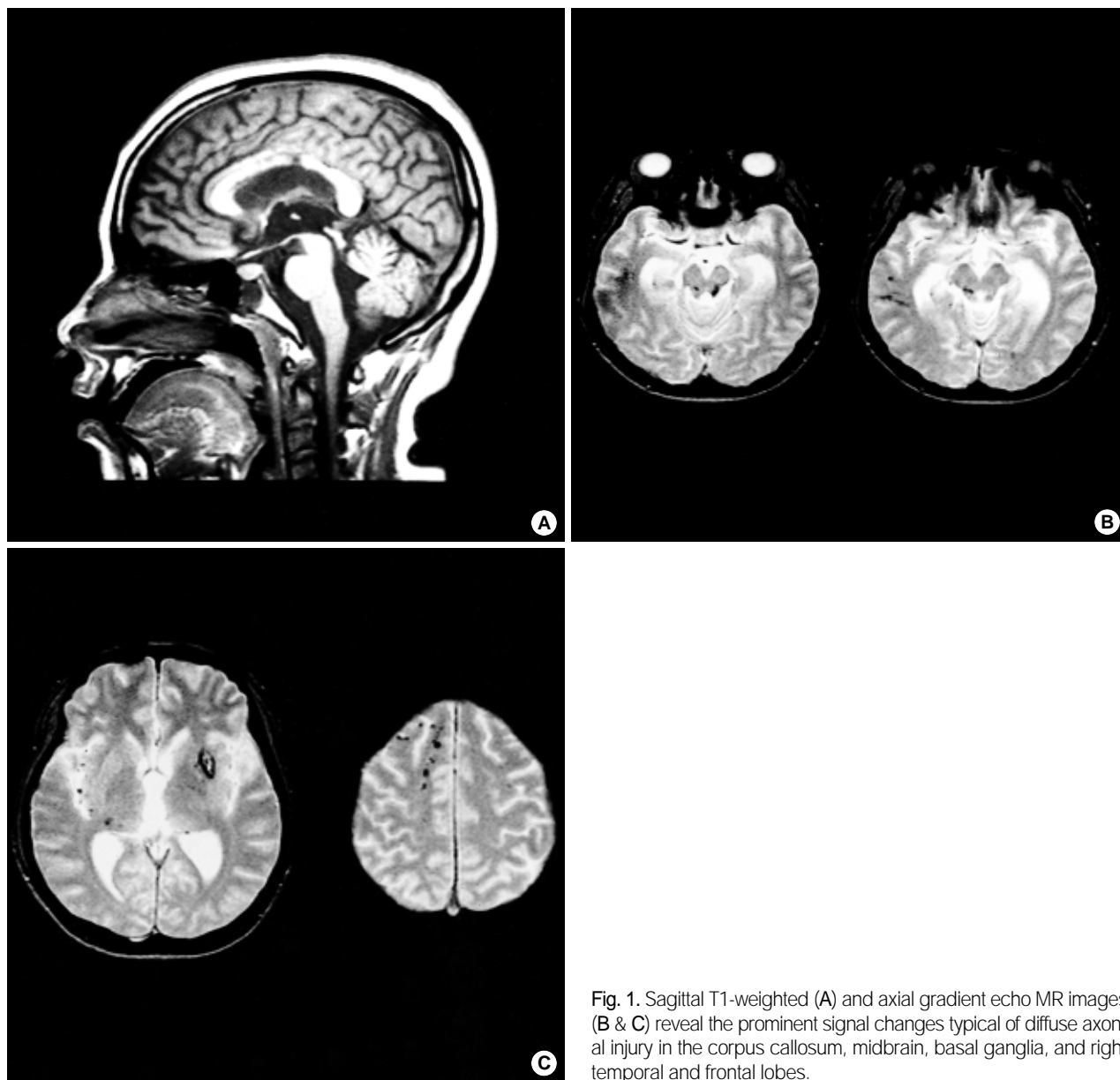


Fig. 1. Sagittal T1-weighted (A) and axial gradient echo MR images (B & C) reveal the prominent signal changes typical of diffuse axonal injury in the corpus callosum, midbrain, basal ganglia, and right temporal and frontal lobes.

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-

come. 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. Judicious shielding of the fetus is desirable whenever possible. A dose of 10 rads or less is unlikely to result in an increase in congenital malformations, growth and mental retardation, childhood cancer or fetal death (16). After the tenth week of gestation, fetal abnormalities are unlikely to result from diagnostic radiation; however, this should not preclude the use of first trimester roentgenography when it is clinically indicated (17). There is always a concern that medications administered to the mother may adversely affect the fetus. In general, therapy appropriate for the injured gravida should be administered. In point of fact, few agents have teratogenic effects if administered in the first 12 weeks of gestation. Agents to avoid would include Dilantin, ergot agents, warfarin sodium (Coumadin), and warfarin derivatives. Among the antibiotics, the aminoglycosides and sulfa-containing agents should be used with caution because of their side effects on the fetus. Penicillin and the cephalosporins have been used and can be administered without adverse fetal effect (16). Moral and ethical issues must be considered when establishing a management plan for lethally injured pregnant patients. Reviews of the ethics of this subject strongly support the role of the family in planning care, and hold that the physician should not be required to provide all available care against the wishes of the family (4, 8, 11). In the case presented here, we offered the opportunity for continued support of the pregnancy after the diagnosis of pregnancy was made. The family, understanding the unknown and probably limited chances for success, chose at that time to give the patient optimal supportive care and to monitor her pregnancy closely. Individuals immobilized for prolonged periods of time may develop a negative nitrogen balance as a result of progressive catabolism (1, 12). Maternal malnutrition may have an adverse effect of the fetus and neonate, with deleterious effects on birth weight and brain development (19). However, assessment of maternal nutritional status proved to be difficult. Maternal weight may not necessarily reflect acute nutritional status changes (12). Strict control of hemodynamics, gas exchanges, and electrolytes and nutritional balance must be carried out for both the maternal and fetal organs during 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 perimortem 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 numerous medications from 4 weeks' gestation, and survived premature labor at 33 weeks' gestation in a persistent vegetative state. This case represents 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.

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