



Cesarean Section in Preterm Delivery with Preserved Membranes

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Abstract

Premature cesarean section with preserved membranes is an innovative method of obstetric cesarean section. It mainly involves removing the fetal sac and fetus completely after uterine incision during the operation, and then removing the fetus after the membrane is ruptured and amniotic fluid is sucked out. This surgical method can reduce damage to the fetus and reduce the probability of amniotic fluid embolism. A 29-year-old pregnant woman, with her first child, developed preeclampsia at 34 weeks of pregnancy, with blood pressure rising to 160/110, urinary protein 3+, edema 3+, and accompanied by dizziness. After undergoing spasmolysis treatment, she underwent a cesarean section with preserved membranes to terminate the pregnancy. The mother and fetus have a good outcome.

Subject Areas

Human Geography

Keywords

Preserve the Fetal Membrane, Cesarean Section, Premature Birth, Surgical Techniques, Damage, Neonatal Outcomes

1. Introduction

With the advancement of perinatal medicine, the success rate of treatment for premature infants and even extremely low birth weight infants is also increasing. Due to the incomplete development of organs, incomplete development of the nervous system and poor tolerance to low oxygen and mechanical stimulation in premature infants, cesarean section delivery is often used. The cesarean section of the lower segment of the uterus is the most common surgical method, but it has certain shortcomings. Due to the incomplete or incomplete formation of the

lower segment of the uterus during premature birth, the uterine muscles are stimulated and rapidly contract after the artificial rupture of the uterine wall, causing thickening of the uterine muscle wall and reduction of the uterine cavity volume. This can easily lead to difficulties in delivering the fetus, compression of the umbilical cord, and aspiration of amniotic fluid [1]. En Caule is the abbreviation for cesarean section with intact membranes, which refers to the delivery of the fetus and amniotic fluid without rupture of the fetal sac. Even if the time from the incision and removal of the fetal sac from the uterus to the delivery of the fetus is slightly longer, the amniotic fluid inside the fetal sac has the ability to resist external stimuli, relieve pressure from the uterus on the fetus, and prevent umbilical cord compression, meaning that the fetus is born while maintaining its original intrauterine environment. Immediately after delivery, the membrane is broken and amniotic fluid is drawn to prevent and reduce the occurrence of amniotic fluid inhalation and asphyxia. En Caule has been developed as a delivery method for premature cesarean section, preserving the fetal membrane and benefiting newborns with extremely low birth weight. It is reported that it can prevent bruising and trauma during delivery of fragile newborns, thereby reducing serious complications, such as intracranial hemorrhage, which can lead to serious incidence rate and sequelae [2] [3] [4] [5]. Not only that, En Caule can also reduce the risk of intraoperative amniotic fluid embolism. Our hospital has conducted a total of 12 cases of retained membranes cesarean section, reducing the risks of neonatal injury, asphyxia, postpartum hemorrhage, amniotic fluid embolism, and other complications. We report a case of severe preeclampsia in a parturient who underwent En Caule surgery. This pregnant woman experienced elevated blood pressure and positive urine protein at 34 weeks, accompanied by dizziness, blurred vision, and lower limb edema (++). After receiving treatment to lower blood pressure and relieve spasms, the pregnancy needs to be terminated immediately. The preferred option is cesarean section, but there may be risks such as uterine muscle retraction during delivery or damage to the surgeon's hands, as well as suffocation caused by inhaling amniotic fluid. Therefore, we chose to undergo En Caule. The surgery was successful, and the fetal sac was completely removed to avoid the aforementioned risks for the fetus.

2. Case Report

Our patient underwent delivery by cesarean section en caul due to the severe pre-eclampsia at 34 weeks of gestation. She was 29 years old, multiparous, and had a history of cesarean section. Her blood pressure was normal throughout pregnancy and urine examination showed no proteinuria. Her pregnancy was uneventful and the fetus grew without obvious abnormalities until at 34 weeks of gestation, suddenly experiencing dizziness, blurred vision, and accompanied by lower limb edema (++), then came to the hospital for prenatal examination and found blood pressure of 160/115 mmHg and urinary protein (+++). The diagnosis is severe preeclampsia in obstetrics. After receiving treatment such as spas-

molysis and lowering blood pressure upon admission, the blood pressure remained stable. With sufficient preparation, a cesarean section with preserved membranes was performed. The fetus and membranes were completely removed during the operation, and a male infant weighing 2380 g was taken out after being handed over to a neonatologist for membrane rupture. Apgar score was 10 points to 10 points (**Figures 1-4**). After 7 days of observation at NICU, the patient was discharged and developed well after 6 months of follow-up.



Figure 1. Remove a portion of the gestational sac.

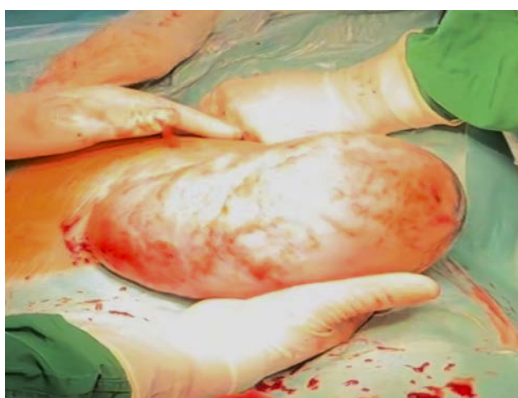


Figure 2. Remove the complete gestational sac.

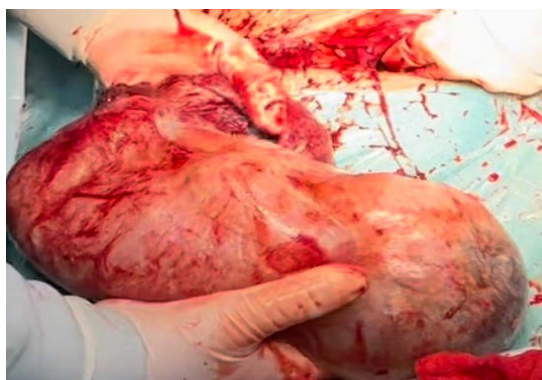


Figure 3. After the amniotic sac and the placenta are free from the uterus, the gestational sac bulges out of the uterus with the fetus contained within it. The sac can then be lifted out in an intact state with the placenta.



Figure 4. Doctors can rupture the fetal membrane, sever the umbilical cord, and perform resuscitation.

3. Discussion

The traditional cesarean section surgery involves cutting open the uterus and performing artificial rupture of the membrane before delivering the fetus. En Caule cesarean section, abbreviated as En Caule, refers to the complete delivery of the fetus and amniotic fluid together when the fetal sac is not ruptured. The fetus is born in the original environment of the uterus, that is, in the intact and unbroken amniotic membrane. The earliest literature report was published in 1983, which first reported that preserving the fetal sac during cesarean section in extremely premature infants can improve fetal prognosis. Liang Meizhen *et al.* [6] selected 53 preterm parturients requiring cesarean section were selected and divided into two groups according to different treatment methods: study group (40 cases undergoing cesarean section with membrane sac retention) and control group (13 cases undergoing conventional cesarean section). The time from anesthesia to fetal delivery, amniotic fluid volume, neonatal weight, neonatal asphyxia rate and Apgar score were compared between the two groups. Conclusion is the application of cesarean section with preserved membranes during preterm delivery is beneficial to reduce the risk of neonatal asphyxia, increase Apgar score and improve neonatal outcome, which has high clinical application value. Dr. Takeshi Murakoshi pointed out that the risks and technical difficulties at the cesarean delivery for extremely premature infant under 1000 g are as follows: (1) A premature infant is very weak for pressure of uterine wall or human hands, (2) Skin of infant is really premature and weak, (3) Uterine wall is thick and difficult to incise at lower segment of uterus, (4) Classical vertical incision or reverse T-shape incision are at risk for future uterine rupture, and (5) At the timing of rupture of membrane, uterine wall may contract drastically and the infant is trapped the uterine wall, so called “hug-me-tight-uterus” [7]. To resolve the problems, the way of use the technique of “En Caul” cesarean, never incise the membrane before the infant was delivered. The baby is delivered with wrapped amniotic fluid and the membrane, which protect the infant against the pressure of uterine wall or surgeon’s hands. Neonatologist can make the membrane ruptured and resuscitation.

4. Conclusions

For pregnant women who have to undergo iatrogenic premature birth due to illness, the benefits of En Caule for extremely premature infants under 34 weeks of gestation, especially those weighing less than 1000 grams, are as follows: (1) Relieve fetal pressure: During premature delivery, incomplete formation of the lower segment of the uterus occurs in pregnant women. After artificial rupture of the uterine wall, the uterine muscles rapidly contract due to stimulation, thickening the uterine wall and reducing the volume of the uterine cavity. This can easily lead to dangerous situations such as difficulty in delivering the fetus and aspiration of amniotic fluid. Premature fetuses are very fragile and are more susceptible to soft tissue damage, nerve damage, and traumatic intracranial hemorrhage than full-term infants. The preservation of amniotic fluid during cesarean section can provide hydraulic protection, resist external stimuli, alleviate fetal pressure, reduce the occurrence of fetal bruising or trauma, and reduce pressure changes from the uterine cavity to the outside of the uterus, thereby reducing the incidence of cerebral hemorrhage. (2) Reducing the need for neonatal resuscitation: Retaining the fetal sac for cesarean section can effectively reduce and prevent the occurrence of amniotic fluid aspiration and asphyxia by immediately breaking the membrane and attracting amniotic fluid after fetal delivery. (3) After the delivery of the fetus, the response is good and the umbilical cord can be delayed. Combined with delayed umbilical cord disconnection, it can increase the blood volume of premature infants, prevent risks such as neonatal anemia, intraventricular hemorrhage, and delayed sepsis, further ensuring the safety of premature infants. (4) Reduce the risk of amniotic fluid embolism and ensure the safety of parturients: keep the fetal sac intact, rupture the membrane outside the body after complete delivery of the fetus, prevent amniotic fluid from entering the mother's body, effectively prevent amniotic fluid embolism that threatens the mother's life, and ensure the safety of the mother's life. (5) There is no significant difference between abdominal and uterine incisions and regular cesarean section, which does not increase the additional surgical risk for pregnant women.

Under what circumstances is a cesarean section with preserved fetal sac performed? As a special delivery method, cesarean section with preserved fetal sac is mainly aimed at premature infants. To maximize the protection of maternal and infant safety and health, preoperative exclusion of placenta previa, blood vessels previa, placental implantation, placental abruption, acute fetal distress, etc., all of which require thorough preoperative evaluation. Surgical physicians must also be highly experienced and proficient in cesarean section, and have high requirements for the cooperation between the main surgeon and assistants.

Conflicts of Interest

The authors declare no conflicts of interest.

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