

Complete cervical inversion and nearly inappropriate stitching with cesarean section during the second stage of labor: a case report

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Abstract

Cesarean section is a common obstetric operation and an important method for saving the lives of mothers and their neonates in dangerous situations. Nevertheless, cesarean section has a higher risk and might have more complications compared with natural delivery. A reasonable choice of delivery method is important for maternal and neonatal health. The incidence of complications after cesarean section for mothers and neonates during the second stage of labor significantly increases compared with planned cesarean section. During the second stage of labor, the fetal head is deep in the pelvic cavity. If a cesarean section is performed at this stage, it is prone to causing complications, including difficult delivery of the fetal head, delayed uterine incision, and massive hemorrhage, which seriously threaten the health of the mother and her neonate. For the first time, we report a case of cesarean section after complete opening of the uterine orifice, which led to almost mistakenly suturing the cervix to the uterus. This report will hopefully help surgeons anticipate such incidents during cesarean section in the future.

Keywords

Delivery, second stage of labor, complete cervical inversion, uterine incision, massive hemorrhage, cesarean section

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Introduction

Over time, the risk of cesarean section has been significantly reduced. In the second stage of labor, the position of the fetal head is low and fixed. If the fetal head is aggressively removed, it can lead to neonatal asphyxia, injury, tearing of the uterine incision, postpartum hemorrhage, puerperal infection, and even bladder and ureter injury.¹ However, there have not been any cases of cervical inversion. For the first time, we report a case of cesarean section after complete opening of the uterine orifice, which led to complete cervical inversion and almost mistakenly suturing the cervix to the uterus.

Case presentation

A 28-year-old woman, gravida 1, para 0, was admitted to hospital at 38⁺⁵ weeks of gestation for leakage of fluid in the vagina. Premature rupture of the membranes was confirmed by a positive result of rupture of the membranes. No other remarkable findings were found during her prenatal course. The patient's cervix was dilated by 1 cm, 90% effaced, mid-position, and soft, and amniotic discharge without meconium contamination was shown by a vaginal exam. There were no particularities regarding her medical history and obstetric history. Her pregnancy course was uncomplicated, and she reported no history of smoking, alcohol abuse, or medication abuse. Color Doppler ultrasound of the fetal heart did not show abnormalities, such as fetal congenital heart disease. During pregnancy, the woman had multiple B-ultrasound scans of her fetus, which showed that the fetus was in a good condition. An abdominal examination and fetal B-ultrasound showed a normal sized fetus and the fetal head was well positioned in the cervix in cephalic presentation through the pelvic check.

Her contractions were irregular, with a frequency of contractions of 7 to 10 minutes lasting for 10 to 25 s. Therefore, oxytocin was started with a low dose (0.1 units/hour by drip and adjusted on the basis of the patient's contractions). Continuous fetal heart rate monitoring showed that the baseline fetal heart rate was normal, and variation and acceleration were not abnormal. Epidural analgesia was engaged when the cervix was dilated by 4 cm. Her cervix was completely dilated 6 hours after the intravenous oxytocin infusion. Thereafter, the patient was transported to the delivery room for expulsive efforts. Thirty minutes later, fetal heart rate monitoring showed frequent severe delayed decelerations and fetal heart rate was as low as 50 to 60 beats/minute. The fetal heart rate did not recover to baseline after oxygen inhalation, pushing up the fetal head, and changing position. The fetal head was in the right occipito-anterior position at +1 cm station. Therefore, an emergency cesarean section was immediately performed and a liveborn male neonate who weighed 3190 g was delivered.

Apgar scores were 8 at 1 minute, 10 at 5 minutes, and 10 at 10 minutes after initial neonatal resuscitation. Gentle traction was applied to the umbilical cord until the placenta was delivered. There was extensive diffuse bleeding on the surface of the uterus and a mass of tissue located in the uterine cavity. The surgeon bundled the lower segment of the uterus with a hemostatic tube to reduce bleeding, and used gauze to compress and stop bleeding during the operation. At the same time, an experienced obstetrician was summoned to identify the tissue where bleeding was located. According to the obstetrician's experience, she believed that the bleeding was caused by laceration of the posterior wall of the uterus and suggested to sew this tissue to stop bleeding immediately. Nevertheless, the surgeon was confused

when no tear was found in the posterior wall of the uterus after careful exploration. There was only extensive diffuse bleeding on the surface of the uterus and edges of tissue in the uterine cavity. There was a 2-cm laceration in the left lower edge of the uterine incision near the bladder, the left incision margin was intact, and the posterior wall of the uterus was normal without laceration (Figures 1, 2). The cervix was not touched in the vaginal examination; therefore, this tissue was confirmed as a fully dilated cervical canal. The tissue was gently placed back into the vagina and laceration of the uterine incision was sutured in layers. After closing the abdominal cavity, a plastic vaginal speculum in cervical tissue was observed in the vagina (Figure 3).

Discussion

Cesarean section is an effective method to rescue pregnant women and their fetuses, but maternal complications are significantly higher in the second stage of labor.² Presently, the main indications of cesarean

section remain unchanged, and these are fetal compromise, a scarred uterus, failure of delivery, and breech presentation. However, during recent years, the mother's request for performing cesarean section has become the fifth common indication of cesarean section.³ There is long-term pressure of the fetal head on the lower segment of the uterus during delivery and deep descent of the fetal head into the pelvis during the second stage of labor. Therefore, repositioning the fetal head is

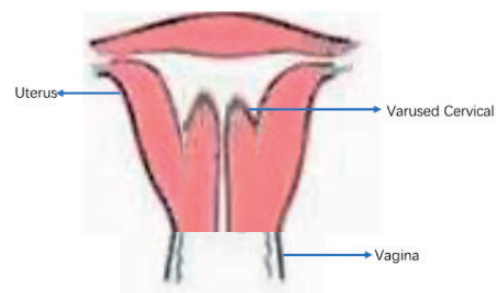


Figure 2. Schematic diagram of complete inversion of the cervix to the intrauterine cavity during the operation.

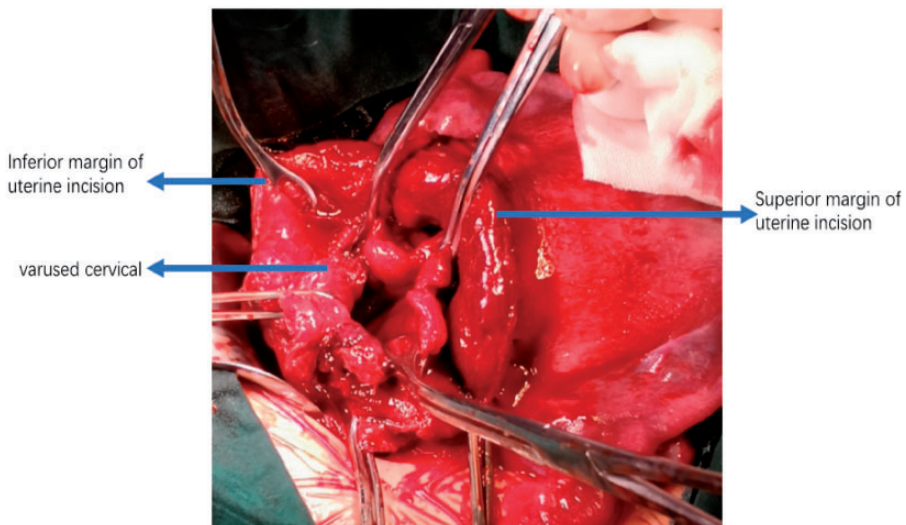


Figure 1. Incision of the uterus and cervical inversion.

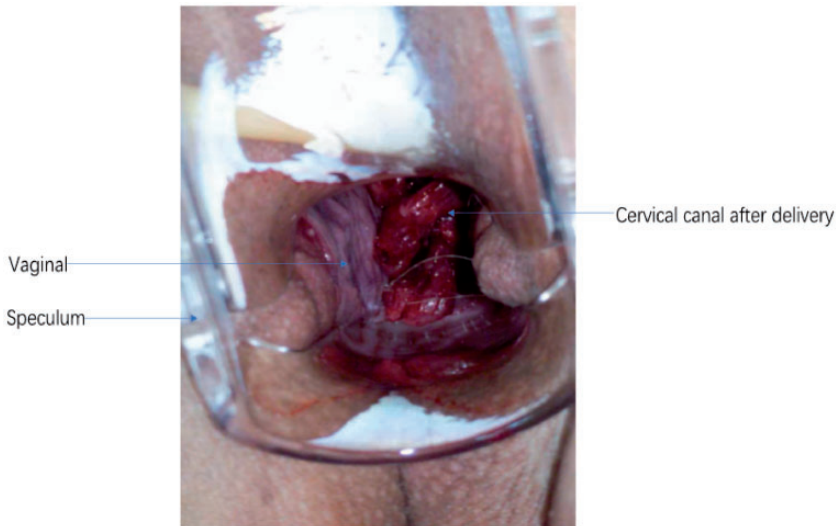


Figure 3. Vaginal speculum after cesarean section.

relatively difficult during the operation, but tearing the incision of the uterus, which causes postpartum hemorrhage and intraoperative trauma, can easily occur (relative risk, 2.6; $P < 0.001$; elective cesarean section vs cesarean section in the second stage of labor).⁴ Simultaneously, the entire labor process becomes relatively lengthy, and it is often complicated by meconium-stained amniotic fluid, further increasing the rate of neonatal asphyxia. Additionally, long-term fatigue and immunity of the parturient are decreased, and accordingly, the incidence of maternal morbidity is significantly increased. Therefore, cesarean section in the second stage of labor is more harmful than that in the first stage of labor, and the risk of perinatal asphyxia is also significantly increased (relative risk, 1.5; $P < 0.05$; elective cesarean section vs cesarean section in the second stage of labor).⁴ The causes of failure in labor after the fetal head is deep in the pelvis are complicated and most of them are due to an abnormal position of the fetal head. An abnormal position of the fetal head and a large fetus makes vaginal delivery difficult. Fetal injury is common in this

situation. Severe fetal cases may even include neonatal skull fracture and intracranial hemorrhage. Severe cases in the parturient may cause considerable perineal laceration and seriously affect the quality of postpartum life. However, recent studies have shown that obstetricians with simulation training can significantly reduce the complications of vaginal midwifery.

Bligard et al.⁵ searched and systematically analyzed all of the literature on vaginal midwifery in a database before April 2017 and examined eight studies. These authors showed that obstetricians, through training, significantly reduced the complications of vaginal delivery, perineal laceration, and neonatal injury, and patients' comfort was significantly improved (range: 9.0–13.5 [Medical Education Research Study Quality Instrument]), but there were no randomized control cases in this study. Kelly et al.⁶ analyzed 934 forceps deliveries and 1074 vacuum-assisted deliveries. They found that, with an increase in operator experience, severe laceration of the perineum was significantly reduced, and the incidence of fetal scalp injury was reduced

when the provider experience was more than 5 years since residency. In our case, continuous electronic monitoring of the fetal heart rate indicated frequent severe late deceleration, and the fetal heart rate dropped to 50 to 60 beats/minute. After treatment of intrauterine resuscitation, such as oxygen inhalation and the lateral position, fetal heart rate did not recover. Taking into consideration the type III fetal monitor and the fetal presentation of +1, the risk of forceps in midwifery was relatively high and this procedure would have been difficult. Therefore, we decided to immediately perform an emergency cesarean section to deliver the fetus.

How to effectively solve the problem of removal of the fetal head is important for reducing the complications of cesarean section in the second stage of labor. The time of vaginal delivery is longer for pregnant women with deep descent of the fetal head in the pelvis. Pregnant women can hold their breath and force involuntarily because of rectal pressure during the labor process. This results in lengthening and thinning of the lower segment of the uterus, tissue edema, and weakness of the uterus (easily torn). During cesarean section, the fetal head is deeply embedded, and therefore, reaching the lowest point of the fetal head is difficult. When the fetal head is held, the uterine incision is easily torn to the lower sides or the front and lower sides of the incision. In severe cases, the incision is torn to the uterine artery and vein, causing massive hemorrhage, hematoma of the broad ligament, shock and even hysterectomy, injury of the ureter and bladder, and urinary fistula. For the fetal head with a deep pelvis, the commonly accepted methods are pushing the fetal head through the vagina and backward hip traction.⁷ However, both methods can lead to serious complications in the mother and the fetus.^{8,9} Some scholars argue that the method of backward hip traction is slightly

better than the method of upward pushing of the head of the fetus.^{10,11} The traction method has the advantages of less possibility of laceration of the uterine incision, less bleeding during the operation, a shorter operative time and hospital stay, and a lower incidence of puerperal diseases compared with the method of removing the head through the vagina.¹² Because the fetal head is deep in the pelvis in the second stage of labor, which significantly increases the difficulty of reaching the lowest point of the fetal head by hand, when the head is held, the uterine incision may tear on both sides and below. In particular, laceration of the incision and massive bleeding prolong the operation time. Additionally, pushing the fetal head up through the vagina is likely to cause tentorial tear of the fetal brain, skull fracture, intracranial hemorrhage, and other adverse injuries to the fetus. Concurrently, this situation increases the possibility of upward vaginal infection (odds ratio, 2.41; 95% confidence interval: 1.68–3.45) and increases the possibility of late bleeding.¹³

According to the literature, there does not appear to be any significant difference in hypoxic morbidity with increasing increments of the uterine incision to delivery time of non-anomalous term neonates.¹⁴ For the non-reassuring fetal status, if the delivery time of the fetal head exceeds 240 s, the incidence of neonatal asphyxia significantly increases (relative risk, 5.58; 95% confidence interval: 1.30–23.91).¹⁵ In clinical practice, delivering the fetus within 3 minutes is difficult, especially for a fetus with a head deep in the pelvis, which is more challenging for inexperienced physicians. In our case, the fetal head had deeply descended into the pelvis, and the patient showed fetal distress before the operation, but the operator quickly and smoothly removed the fetus. After taking out the fetal head, a mass of tissue under the uterine incision with continuous active

bleeding was observed. Initially, the operator considered rupture of the posterior wall of the uterus because the wound was obviously bleeding and there was no indication that the cervix was completely inverted into the uterine cavity. The operator wanted to restore the anatomy and hemostasis through the zigzag suture. However, the margin of the mass was relatively smooth. After the wound was compressed with gauze, it was examined carefully along the posterior wall of uterus. The endometrium was intact, and there was no obvious tear. Only a 2-cm tear extending to the bladder could be seen in the left incision of the uterus. During pregnancy, color Doppler ultrasound did not indicate abnormal uterine development. At this time, the surgeon considered that this mass of tissue was a completely dilated and inverted cervical tube, which was confirmed by the assistant through a vaginal examination. In our case, the cause of cervical inversion might have been due to the fetal head being completely attached to the cervix when the fetus was taken, which caused the cervix to turn inward into the uterine cavity owing to pressure. However, there have been no reports of cervical entropion caused by cesarean section to date.

In cesarean section in the second stage of labor, surgeons should fully evaluate the size of the fetus and the high-risk factors of the parturient. During the course of labor, the progress of labor should be closely observed. Once the second stage of cesarean section is required, the difficulty of the operation should be fully evaluated before the operation to minimize the occurrence of complications. Before the operation, physicians should check the condition of the parturient and the fetus. Factors to check include the position of the fetal head, the orientation of the fetus, the location and size of uterine myoma, whether the fetal head is deformed or even embedded in the pelvic cavity, whether the parturient has

potential infection or bleeding factors, and whether the fetus is in distress in the uterus. Additionally, the operation should be performed by an experienced doctor.^{15,16}

We report a case of cervical inversion, which was improperly diagnosed as myometrial rupture of the posterior wall of uterus, during the second stage of vaginal transfer to cesarean section. During the operation, the posterior wall of the uterus and endometrial surface should be carefully checked to prove that the cervical tube is completely inverted, avoiding the occurrence of incorrect suture repair and medical complications. Therefore, surgeons should be familiar with the characteristics of laceration of the lower uterine segment and a soft birth canal in patients who are transferred to receiving cesarean section after intending vaginal delivery. When suturing the incision of the lower uterine segment during cesarean section, surgeons should carefully check whether there is a tear and whether the endometrial surface is complete enough. Finally, surgeons should identify and deal with problems as early as possible to avoid medical disputes or malpractice.

Ethics statement

Written consent for treatment was obtained from the patient. The patient's details have been de-identified. The ethics review committee waived the requirement for ethics approval because of the nature of the study (case report). The patient provided verbal informed consent for publication.


Declaration of conflicting interest

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