

Obstetric Clinic

THE woman about to become a mother or with a new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden, or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation, when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law brought down upon its victims by a machinery as sure as destiny, is arrested in its fall at a word which reveals her transient claim for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in her hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly or selfishly.

OLIVER WENDELL HOLMES

14th and last of the Series

ACCIDENTS OF LABOR*

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ACCIDENTS of labor continue to contribute a considerable percentage to the maternal death rate. In our previous clinics on rupture of the uterus, postpartum hemorrhage and anesthesia many of the common adversities of labor have been discussed. Now our purpose is to comment upon some of the less frequent complications of labor such as transverse presentation, prolapse of the cord, inversion of the uterus and failed forceps. In their management by version and extraction, forceps, craniotomy, Dührssen's incisions and the like, art often outstrips science. It will never be otherwise.

CASE I. A twenty-nine year old gravida III, para I entered the hospital at term with uterine contractions every three minutes, intact membranes and a bloody show. Her prenatal course had been uneventful. Four years before she had been delivered of a 9 pound, 9 ounce baby by forceps rotation and extraction after fifteen hours of labor.

The vertex was unengaged, the cervix 5 cm. dilated and thick. Since the baby appeared to be large, x-ray pelvimetry was performed. The roentgenologist reported no cephalopelvic disproportion and classified the pelvis as gynecoid.

Two hours later contractions were strong and regular, so demerol, 100 mg., and scopolamine, $\frac{1}{150}$ gr., were administered intravenously. On vaginal examination the cervix was found to be 8 cm. dilated and still thick. During this examination the membranes ruptured and the vertex descended to the ischial spines. After two hours of full dilatation, vaginal examination found the vertex in L. O. T. position with considerable caput formation. It was estimated that the vertex was at or just below the spines. Under cyclopropane anesthesia, after manual rotation failed, Kielland's forceps were applied but neither rotation nor descent could be effected. Internal podalic version was then performed and a 9 pound, 8 ounce stillborn fetus was extracted with ease.

* Cases are from the Committee on Maternal Welfare of the Medical Society of the County of Kings, Brooklyn, N. Y. The text of the case reports is essentially as submitted to the Committee. The views expressed are those of the authors.

The placenta was extruded one minute later; blood loss was slight. At the end of the third stage the patient's condition was good, and the pulse was regular and of good quality. During repair of the episiotomy the anesthetist reported that the patient's blood pressure had fallen to zero. Blood which had been cross-matched was immediately administered. Respiration flagged and the patient died within twenty minutes. At autopsy the uterus was found to be ruptured.

CASE II. A thirty-six year old gravida vi, para v, with mild diabetes was admitted to the hospital in active labor. Previous pregnancies and deliveries had been uneventful except that all her babies were quite large, the last one weighing 11 pounds.

After twelve hours of active labor the cervix was 8 cm. dilated and the vertex at -3 station in the R. O. P. position. The membranes were then artificially ruptured but several hours later, despite good contractions, no progress had been made. In fact, cervical dilatation seemed less, due to increasing cervical edema. Morphine relieved pain yet regular and strong contractions continued. Since no progress had been made, the patient was taken to the delivery room where the cervix was found edematous and thick although dilatable, and the vertex at -1 station. Following several unsuccessful attempts at application of forceps, difficult version and extraction were performed. The operation took about one hour and resulted in the delivery of a stillborn fetus weighing 13 pounds, 4 ounces. Manual removal of the placenta was then performed because of profuse hemorrhage. The patient's condition on returning from the delivery room was fair, her blood pressure 100/60 and her pulse 96.

The following morning her condition was good except for a very tender abdomen attributed to the trauma associated with delivery. Later that day abdominal distention, nausea and vomiting appeared. The next day her temperature began to rise. Vomiting, distention and fever continued until death on the fourth postpartum day. At autopsy generalized peritonitis secondary to a rent low in the posterolateral wall of the uterus was found.

Questions. (1) What are the indications for version and extraction? (2) Is version indicated in routine management of the second of twins? (3) How are cases of failed forceps best

managed? (4) What is the best anesthetic for version?

Answers. *Version, hallowed by time, has been all but discarded as an accepted obstetric procedure largely because it is always a potentially hazardous operation for which safer procedures may now easily be substituted.* The discovery and use of the antibiotics permit obstetricians to perform cesarean section on many patients for whom, in years past, version and extraction would have been elected. It has been said that a timely version will often ease the obstetrician out of many a difficult situation, but not, however, without the risk of creating a new problem for the mother and perhaps for the baby too.

What then are the indications for version? Few indeed. Prolapse of the cord when the cervix is fully dilated or nearly so, and the head beyond the safe reach of forceps, in the multipara is an accepted indication in the interest of the baby. In the primipara, however, if the presenting part is too high to risk forceps extraction, the patient should be placed in the Trendelenburg position and given oxygen while awaiting cesarean section. If fetal distress is clear, one may be assured that the deep general anesthesia necessary for version and extraction through a nulliparous birth canal will probably result in fetal death and frequently severe or fatal maternal injury as well.

The only other obstetric emergencies in which version may be indicated are transverse presentation in the multipara with the cervix fully dilated or nearly so, and the membranes intact or recently ruptured, and transverse presentation or distress of the second of twins. Transverse presentation in the primipara is best treated by cesarean section.

Routine version and extraction for delivery of the second twin increase maternal and fetal risk and are definitely contraindicated. We see no indication for this procedure other than the obstetrician's convenience. Uterine atony and postpartum hemorrhage are encountered frequently following multiple births because of overdistention of uterine muscle. If the obstetrician should choose to add the hazard of the deep anesthesia so necessary for version to rapid delivery by extraction, he must be prepared to accept the risk of excessive blood loss. A recommended routine for management of twin births is outlined which will eliminate the undesirable prolonged waiting period between the delivery of the first and second

babies, and also bring about a desirable high incidence of spontaneous birth of babies which often tend to be premature or small.

As soon as the first baby has been delivered, a vaginal examination is performed, the second amniotic sac ruptured and the presenting part identified. It is assumed that general anesthesia has been minimal. If the presentation is normal, a continuous drip of pitocin solution 1:500 is given through the venoclysis which should be functioning routinely at all multiple births. The rate of flow should be 30 drops per minute. Within a few minutes, even in those cases in which more than minimal general anesthesia (which is not advised) has been administered for delivery of the first baby, uterine contractions will be resumed and spontaneous delivery occur. Three minims of pitocin are then injected into the intravenous tubing and the drip continued. Uterine contraction is prompt and vigorous, bleeding minimal and the placenta will be extruded with little difficulty. The use of this simple technic will bring about marked reduction in the incidence of operative delivery and its partner, postpartum hemorrhage.

There is no place today for version in the management of persistent occiput posterior position, cephalopelvic disproportion, uterine inertia, failed forceps, abruptio placenta or placenta previa. Brow and posterior face positions in the multipara when the pelvis is normal and the baby of average size may be indications in the hands of the adept. At one time, to perform cesarean section late in labor was to court disaster from generalized peritonitis and sepsis, so that version would be resorted to as the lesser of two evils. Present day use of powerful antibiotics, availability of blood, and improved anesthetic and operative technics permit the performance of cesarean section with minimal risk.

The management of failed forceps should present no serious problem to the obstetrician. If forceps should fail, an error has been made in either judgment or technic, often both. Version is never a justifiable solution of the problem of failed forceps even though results should be good in some cases. Both fetal and maternal risks forbid its use. The defeated obstetrician who attempted delivery by version after he has failed with forceps admits frustration.

What then is the course to be followed when forceps delivery fails? *No immediate attempt at delivery should be made.* Anesthesia, if general,

should be discontinued and an infusion begun while cross-matched blood is made available and antibiotics are administered. Dextran is suggested. It is as good as plasma and safer. The intravenous as well as the intramuscular routes may be advisable for antibiotics in order to obtain immediate high levels. An opinion must then be formed as to the reason for failure of forceps.

Usually failure is due to an unsuspected contracted pelvis, a large fetus or non-engagement of the vertex, unrecognized because of excessive moulding or caput formation. Occasionally a monstrosity or an unrecognized occiput posterior will cause forceps to slip. At this point roentgen pelvimetry would be highly desirable. If the pelvis should be ample and the fetus not abnormal, a further test of labor will often result in uncomplicated delivery. The alternative, of course, is some type of cesarean section supplemented by blood transfusion and vigorous antibiotic therapy with avoidance of general anesthesia. If episiotomy preceded or laceration resulted from the unsuccessful forceps attempts, repair should be carried out before deciding on the subsequent course of action.

Ether should always be the anesthetic agent when version or breech extraction is contemplated. The patient must be in the deep surgical stage of anesthesia before any attempt is made at turning the baby. Conduction anesthesia is definitely contraindicated. Chloroform, otherwise ideal, is dangerous. A common mistake of many anesthetists is to indicate that the patient is ready for version before relaxation is complete. If uterine contraction occurs or spasticity is present when the operator's hand is introduced into the uterus, deeper anesthesia and relaxation must be awaited.

Rupture of the uterus, hemorrhage and shock following laceration of the uterus, or atony secondary to deep anesthesia are the chief causes of maternal death. Not less than 1,000 cc. of cross-matched blood should be available and venoclysis must be functioning through at least an 18 gauge needle before delivery is attempted. Intravenous pitocin should be given immediately after delivery of the baby and manual exploration of the uterus is a *sine qua non*. The fetal risks are even greater than maternal. Intracranial hemorrhage, asphyxia, brachial plexus injuries, adrenal and liver hemorrhage and fractures

are not uncommon. It is difficult to conceive of any fetus, if it were in its power to choose, electing version and extraction for its delivery.

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CASE III. A young primipara was admitted to the hospital at term with ruptured membranes. On abdominal examination the presenting part was unengaged and the position was diagnosed as left sacral posterior. Twelve hours later the patient was having mild uterine contractions. Vaginal examination then found the cervix but 1 cm. dilated and somewhat thick with an irregular presenting part which was thought to be a foot. During the next twelve hours uterine contractions became more regular. The cervix was then found to be about 8 cm. dilated with what was diagnosed as a knee presenting. Six hours later cervical dilatation was complete; and as no further progress was made in descent of the presenting part, delivery was decided upon.

Under deep anesthesia the presenting part, which was now correctly identified as an elbow, was pushed upward out of the pelvis and both feet were grasped and brought down. Version was difficult, as was the extraction. The baby weighed 7 pounds, 3 ounces, and died one-half hour after delivery. The placenta was removed manually and the uterus then explored. Bleeding became profuse and the uterus remained atonic despite massage and repeated doses of oxytocics. Another exploration of the uterine cavity found no rupture. Preparations for transfusion were immediately made and the uterus was tightly packed. The patient was now in deep shock and died fifteen minutes later while the first transfusion was being given.

At autopsy the uterus was found soft, atonic and filled with blood-soaked packing. The cause of death was shock secondary to prolonged labor, difficult delivery, deep anesthesia and hemorrhage.

Questions. (1) How is transverse presentation best managed? (2) When should the uterus be explored following version? (3) Is manual removal of the placenta indicated at the time of uterine exploration? (4) How might this death have been prevented?

Answers. The management of transverse presentation has been considerably simplified in recent years due to wider employment of cesarean section. *Primiparas with transverse presentation should always be delivered ab-*

dominally. Even though the cervix is fully dilated at the time transverse presentation is first recognized, delivery should be by cesarean section. Whether the membranes are ruptured or intact has no bearing on management. The fetal mortality associated with vaginal delivery in the primipara, aside from maternal complications, prohibits its use.

In the multipara some patients may be managed by version followed by spontaneous delivery or by version and extraction. The management of transverse presentation in the multipara will depend almost entirely on the status of the membranes and the cervix. A policy of watchful expectancy may be followed as long as the membranes remain intact. When full dilatation has occurred, delivery may be accomplished by version and extraction. If the membranes rupture prior to full dilatation, an immediate vaginal examination is made to rule out the possibility of a prolapsed cord, so common with this presentation, and also to determine the ripeness and degree of dilatation of the cervix. If the cervix is dilated sufficiently to admit a hand, version is performed, anesthesia discontinued and delivery awaited unless a new maternal or fetal indication should arise. When cervical dilatation is not sufficient to admit a hand yet the cervix is quite ripe, one may observe the progress of labor for a short while, certainly not more than an hour or two, hoping for sufficient dilatation to permit version. If this should not occur, cesarean section should be performed. Dilating bags have no place in the treatment of transverse presentation.

The frequent association of placenta previa with transverse presentation should be kept in mind. It has been reported as high as 25 to 30 per cent.

Exploration of the uterus and vagina after version should be done immediately after delivery. It is not necessary to disturb the placenta. Rupture, if present, will be found involving the cervix or lower uterine segment, not at the placental site. Manual removal of the placenta in the absence of bleeding is dangerous. Uterine atony is the rule following the deep anesthesia necessary for version, and for this reason there should be no efforts at placental expression. Enough time should elapse for the uterus to regain its contractility. Intravenous administration of an oxytocic as soon as the baby has been delivered will be found helpful in counteracting atony.

There were many errors of judgment in the management of this patient. Delivery should have been by cesarean section even though diagnosis was late. Manual removal of the placenta should have been deferred until uterine tone had returned. Hemorrhage should have been anticipated and cross-matched blood should have been available before version was attempted. Then, too, this case illustrates the futility of uterine packing in the treatment of hemorrhage.

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CASE IV. A thirty-four year old primipara in the thirty-eighth week of pregnancy, while being admitted to the hospital for severe pre-eclampsia, experienced an eclamptic seizure and fell to the floor fracturing her right humerus at the surgical neck. Because of her critical condition the fracture was not discovered until several days later.

Following the convulsion the patient lapsed into coma. Her blood pressure was 230/130, the pulse rapid and regular, and rales were scattered over both lung fields. Proteinuria was reported as 4 plus and the uterus was palpated several fingers below the xyphoid process. There were no audible fetal heart tones. Weak irregular uterine contractions were present.

During the next twelve hours the patient had sixteen convulsions. Treatment consisted of morphine, digitalization, intramuscular magnesium sulfate and hypertonic intravenous glucose. During the next four days her condition gradually improved; the blood pressure dropped to 140/100, urinary output increased, edema disappeared and proteinuria diminished. Her temperature, which had fluctuated between 102° and 106°F. the first twenty-four hours, returned to normal on the second day, when it was first noted that the patient was losing amniotic fluid. However, uterine contractions had apparently stopped.

On the fifth day after her first eclamptic seizure labor became active, and six hours later a hand presented at the vulva. Consultation was obtained. On vaginal examination the cervix was found fully dilated and the presentation transverse with the shoulder impacted. A retraction ring was seen and no fetal heart sounds were audible. The patient's temperature had again risen to 103°F. Large doses of antibiotics were administered intravenously and intramuscularly, and the patient was taken to the operating room.

She was placed in low stirrups and the perineum and abdomen prepared surgically, following which the abdomen was draped for a laparotomy and the perineum draped for delivery. With the patient under deep ether anesthesia, one team of surgeons opened the abdomen through a low midline incision from symphysis to umbilicus. The obstetrician performed an episiotomy and introduced his right hand into the uterus after displacing the shoulder upward. Then, with his left hand inside the peritoneal cavity through the abdominal incision, a slow careful version was performed. Cross-matched blood was available in the operating room and a venoclysis was functioning. All preparations were at hand for immediate hysterectomy if it should become necessary.

Following completion of the version, extraction of a macerated stillborn fetus was accomplished with ease. Relaxation of the uterus after delivery of the placenta was controlled by direct massage and intravenous oxytocics. The abdomen was then closed. The patient's post-operative course was smooth with normal temperature from the second day on.

Question. How is neglected transverse presentation best managed?

Answer. This case, although the patient did not die, is presented because of a new approach to the problem of neglected transverse presentation. Textbooks offer several solutions for the management of this rare but serious complication. Decapitation by means of a sickle knife with extraction of the body by traction on the arm, followed by delivery of the decapitated head, is a procedure of considerable risk except perhaps in the most expert hands. Its use is limited of necessity to dead babies. Who, in modern day obstetrics, will ever have the opportunity to become expert in such a procedure?

Extraperitoneal cesarean section, although mentioned as a method of treatment, is not a good choice for technical reasons. If the incision is kept in the lower segment, as it of necessity must be if the operation is to remain extraperitoneal, the shoulder and arm will present in the incision with the laterally flexed head well above. One must then attempt to complete a version through an incision in the lower segment, which is difficult, dangerous and impractical, or of necessity extend the incision

high enough to deliver the head first. If the latter is done, the operation will no longer be extraperitoneal. Cesarean hysterectomy is reserved possibly for those women who have two or three living children.

The only satisfactory method of treatment remaining, then, is lower segment cesarean section through a longitudinal uterine incision so that adequate room will be available for delivery of the vertex. The patient must be protected against infection by adequate pre- and postoperative antibiotics.

If a lower segment operation or cesarean hysterectomy is elected as the procedure of choice, it seems to us both feasible and desirable to attempt version once the abdomen has been opened. If version is not possible, the originally planned operation may be performed. The risk of rupture of the uterus should be extremely small; and even if it did occur, prompt life-saving action would be possible. The advantages of this new type of version are obvious.

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CASE V. A young primipara at term was admitted to the hospital with irregular uterine contractions. The membranes were intact and the cervix 2 fingers dilated; the vertex was unengaged. After twelve hours of labor the cervix was found to be fully dilated with the vertex at a +1 station in R.O.P. position. Under caudal anesthesia several unsuccessful attempts were made at forceps rotation. When forceps were removed, the umbilical cord was found prolapsed in the vagina. Caudal anesthesia was supplemented with ether and an attempt made at version which could not be completed because of the tight uterus. All anesthesia was then stopped and treatment instituted for the mild shock which had developed. An obstetric consultant saw the patient one hour later and advised conservative management. At this time the vertex and one hand were presenting at the inlet, and the patient was again beginning to have uterine contractions. Her condition was much improved following a transfusion of 1,000 cc. of blood. The cord was still present in the vagina but no pulsations could be felt. After five hours of fair contractions the vertex was found at the level of the spines. Craniotomy was decided upon as the patient's pulse rate was again rising and secondary uterine inertia had developed. Another 500 cc. transfusion of blood was begun

and under gas-oxygen-ether sequence the vertex was perforated with a Smellie perforator, crushed and extracted with a cephalotribe. The placenta was removed manually and the uterus explored. Blood loss was considered minimal, yet the patient was in shock. Another transfusion of 1,000 cc. of blood was administered with but little improvement and the patient died two hours after delivery. At autopsy the cause of death was certified as shock and hemorrhage.

CASE VI. This patient was a twenty-four year old primipara with pre-eclampsia who was admitted to the hospital for observation two weeks prior to term. Her blood pressure was 160/100 and urinalysis showed slight proteinuria. Induction of labor was decided upon after four days of observation as toxemia appeared to be unimproved. On vaginal examination the pelvis was considered ample, with the fetus in R.O.P. position at a -1 station and the cervix 1 finger dilated. The membranes were ruptured artificially and irregular uterine contractions began eight hours later. Labor progressed slowly, and after twenty-six hours the cervix was fully dilated with the vertex at the spines still in posterior occiput position. Two hours later, because of lack of progress, forceps delivery was attempted but was unsuccessful apparently because of a contraction ring. Ether anesthesia was discontinued and consultation was obtained. Anesthesia was then resumed and manual rotation was attempted. This, too, was unsuccessful. Since the fetal heart sounds had disappeared after the first attempt at delivery, the head was perforated and delivery effected with a cranioclast. This procedure was difficult and prolonged, with the patient in shock at its conclusion. Exploration of the uterus showed no evidence of rupture. A blood transfusion was begun but pulmonary edema soon developed and death followed three hours later.

Questions. (1) What operative procedure might have been substituted for the foregoing type of craniotomy? (2) What is the risk of craniotomy? (3) How should prolapse of the cord be treated in the primipara? (4) Is craniotomy on a live baby ever indicated?

Answers. Craniotomy as described would seem hardly defensible. Since 1940 modern obstetrics has entered a Renaissance period as the result of sulfonamides, antibiotics, avail-

ability of large amounts of blood, improved anesthetics and surgical technics, and wider use of the cesarean operation in treatment of complications. The period prior to 1940 might well be known as the Traumatic Era, when maternal and fetal mortality as well as morbidity were truly appalling. It was then that cranioclasts, cephalotribes and various other crushing and tearing instruments were used for delivering babies who might have been delivered otherwise if fear of puerperal sepsis were less. One would indeed be hard put to justify the performance of some of the types of embryotomy still described in standard textbooks. Most of these destructive instruments could well be removed from their sterile wrappings and deposited in obstetric museums.

One does not like to subject a woman to cesarean section when it is known that the baby is already dead. However, craniotomy when the vertex is unengaged or just engaged at mid-pelvis is often a prolonged and formidable procedure. Delivery of the head from these high stations, even when crushed, is very difficult and associated with extensive maternal laceration. Maternal mortality rates as high as 10 per cent have been reported. Prolonged anesthesia, hemorrhage and, not infrequently, shock are invited. Cesarean section might well have been a wiser choice, yet a much simpler procedure will usually suffice. Simple perforation of the skull with a Smellie perforator is usually all that is necessary. General anesthesia is not required. In fact, if any anesthesia is necessary, local pudendal block will suffice. The scalp is grasped with clamps in the region of the small fontanel preferably, incised and the perforator inserted between the sutures, and the cranial contents broken up. The clamps are then placed upon the edges of the cranial bones and a 1 or 2 pound weight tied to the clamp handles with a bandage, and the patient allowed to continue in labor. Traction keeps the vertex flexed, stimulates labor and assists in descent. Adequate supportive therapy is given; fluids for acidosis, blood to prevent shock and antibiotics to combat infection. Spontaneous delivery will be the rule rather than the exception.

Craniotomy on the living fetus is no longer an accepted obstetric procedure. Always questionable today, there can be no valid indication for its performance. Even cephalopelvic disproportion secondary to hydrocephalus is easily managed by awaiting sufficient cervical dilata-

tion to permit its decompression. This is easily accomplished vaginally by inserting a long, large-bore needle through a fontanel or open suture and aspirating the excess fluid. This is but the obstetric application of an accepted pediatric procedure for the management of hydrocephalus after birth.

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CASE VII. A twenty-five year old primipara whose prenatal course had been normal was admitted to the hospital at term in active labor. After six hours of labor she was delivered of an 8 pound, 1 ounce baby spontaneously. The placental stage was slow so repeated attempts at manual expression were made. Delivery of the placenta was finally accomplished by vigorous fundal pressure. Inversion of the uterus was immediately diagnosed by the intern in attendance, who attempted to reposit the uterus and then packed the vagina tightly. No anesthesia was necessary as the patient was in profound shock. Intravenous glucose and plasma were administered. When the patient was seen by an attending physician an hour later, her condition was still critical although thought to be somewhat improved. The packing was not disturbed. Examination of the abdomen showed nothing of note other than the firmly contracted uterus just to the left of the midline. A 500 cc. transfusion of blood was administered one hour later when shock became even more profound. The patient died three hours postpartum. At autopsy the firm mass felt in the lower abdomen was found to be the inverted uterus which had been pushed upward by the tight vaginal packing.

CASE VIII. After five hours of labor a young primipara was delivered by low forceps under general anesthesia. Following several unsuccessful attempts at Credé expression, the placenta finally appeared at the vaginal introitus as the result of abdominal pressure and gentle traction on the cord.

The uterus was inverted with the placenta still attached. The patient, in mild shock, was treated with a glucose infusion while blood was being cross-matched.

When obstetric consultation was obtained about a half hour later, the patient's condition had somewhat improved. She was anesthetized again and the consultant removed the placenta manually. During and after this procedure hemorrhage was profuse and shock recurred.

With some difficulty the inversion was corrected and the uterus and the vagina were packed. A 500 cc. transfusion of blood was given rapidly and the patient improved, the blood pressure rising to 90/60. While a second transfusion was begun, the patient began to bleed through the vaginal packing. Shock once more became profound and death occurred about three hours later.

Questions. (1) Is the diagnosis of inversion of the uterus difficult? (2) How is it produced? (3) What is the best treatment? (4) How should the placenta be managed if still attached?

Answers. It is indeed a shocking experience for both patient and obstetrician when this rare complication occurs. Its incidence has diminished in recent years as a result of better management of the third stage of labor. Chronic inversion of the uterus will not be discussed as we are considering only complications of the immediate postpartum period.

Inversion of the uterus is either complete or incomplete. Diagnosis of the complete type is easy. The uterus turned inside out will be seen at the vaginal introitus. In incomplete inversion the fundus remains in the upper vagina and diagnosis may not be obvious. Abdominal palpation may be of little value, especially if the patient should be obese or heavily muscled. Shock and hemorrhage are the characteristic symptoms. A diagnosis of rupture of the uterus will be suspected if shock is out of proportion to the blood loss. Uterine exploration will then readily make the diagnosis of inversion of the uterus. Surely all by now will agree that this type of examination should be routine in any case of obstetric shock or postpartum hemorrhage.

Despite the rarity of this complication, a rather extensive literature is concerned chiefly with two controversial points: first, whether inversion is the result of trauma; and secondly, whether management should be primary shock therapy or immediate correction of the inversion.

The etiology of inversion is not fully understood, yet certain predisposing factors are clear. That spontaneous inversion has occurred cannot be denied, yet there is little doubt that in the great majority of cases, as in the two reported here, trauma plays a definite role. Trauma alone is not sufficient to cause inversion else its incidence would be much higher. Traction on the cord of itself will not cause it.

The cord will tear and undoubtedly it has ruptured many times before inversion could occur. Similarly, pressure on the fundus heavy enough to cause ecchymosis of the patient's lower abdominal wall will not invert the uterus. In fact, inversion of the uterus cannot be produced by either or both of these procedures unless other conditions are present. Fundal insertion of the placenta appears to be present in all cases; yet since this is said to occur in the neighborhood of 30 per cent of all deliveries, another predisposing factor must be assumed. Uterine atony must be present, and at that an unusual type of atony including only the fundal placental site, for once relaxation and dimpling occur in this area contraction of the lower uterine areas must occur to result in inversion. Especially must this be so when inversion has occurred after extrusion of the placenta. It is this later unusual type of atony which accounts for the fact that inversion is rare. Even though the placental site should be atonic, if management of the third stage is proper inversion can almost certainly be avoided. It is likely that there must be a thinning of the fundal musculature of the uterus. This may be on a congenital basis secondary to minimal defect in proximal Müllerian duct fusion not sufficient to produce bicornuate changes. This would explain the occasional tendency for reappearance of inversion in a subsequent pregnancy as well as its prompt recurrence after replacement. Veterinarians have long reported the not uncommon incidence of inversion of the uterus in animals.

The best treatment of inversion of the uterus is immediate replacement. The sooner the attempt is made at replacement, the more successful it is likely to be. Firm contraction of the lower segment will not have occurred and general anesthesia will not be necessary. The technic of replacement is simple yet must be carefully carried out to be successful in most cases. With the whole hand in the vagina, the globular inverted fundus is grasped with the fingers posterior and the thumb anterior, and gently squeezed. Slow, steady pressure is then made upward in the curve of Carus. *Two points in the procedure are of importance.* The first is to remember not to press backward to the spines or sacrum, but upward into the abdominal cavity in a line perpendicular to the superior pelvic strait. The second is to maintain the pressure steadily. This will pull on the

uterine ligaments and so help to correct the inversion. If difficulty is encountered, several sponge sticks or ring clamps may be placed on the cervical rim and countertraction made downward as the fundus is gently pushed upward. When the uterus has been repositioned an intravenous oxytocic should be given and uterine massage performed between the internal and external hands. When uterine tone has returned, the hand may be removed from the uterus. Uterine packing will not be necessary. The uterus should be carefully observed through the abdominal wall for one hour after replacement.

Many of these patients will go into shock immediately following inversion. There seems little doubt that shock is neurogenic in origin due to traction and pressure resulting from constriction of the rich ovarian and uterine plexuses of nerves beneath the peritoneum, just as a severe blow to the solar plexus may produce shock. In the case of inversion, however, shock is apt to be more prolonged and severe as the nerve plexus trauma is continuous rather than the result of a single blow.

Immediate shock therapy is indicated. Intravenous neo-synephrine 1:500 solution is given, and blood should be made ready for transfusion if indicated. Postpartum hemorrhage is common with this condition and is the cause of death. Blood loss indeed may be minimal yet sufficient to aggravate the already existing neurogenic shock. As is true of postpartum hemorrhage due to other causes, there will be ample time to treat these patients. Death does not immediately follow inversion but usually occurs three to four hours later.

If the patient is first seen hours after the inversion has occurred and shock is profound, adequate shock therapy should be begun before any attempt is made to reposit the uterus. Blood is essential in these cases as almost invariably there has been associated blood loss.

If the placenta is still attached, as it will be in the majority of cases, an attempt should be made to replace the uterus with the placenta still attached. Although more difficult, this will be possible if inversion has just occurred. After the uterus has been repositioned, manual removal of the placenta should not be attempted until an intravenous oxytocic has been administered and uterine tone has returned. When the placenta has been separated, it should be delivered by traction on the

cord, leaving the hand in the uterus for bi-manual massage.

If it is necessary to remove the placenta in order to reposit the uterus as in Case VIII, this should be delayed but only long enough to have adequate blood replacement available.

The best prophylaxis of all is the use of the slow delivery technic and administration of an intravenous oxytocic with the anterior shoulder.

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CASE IX. A twenty-eight year old primipara was admitted to the hospital at term. The vertex was in L. O. P. position at -2 station, the cervix about 3 cm. dilated and the membranes were intact. Several hours later labor began but contractions were irregular and of poor quality. The roentgenologist reported an android pelvis and no cephalopelvic disproportion. After twenty-four hours of irregular contractions the membranes ruptured and the vertex descended to the level of the ischial spines; the cervix was now dilated 4 cm. After another twelve hours of painful and somewhat irregular contractions the vertex was found at +1 station and the cervix 7 cm. dilated. Since the patient appeared to be exhausted and the amniotic fluid was meconium stained, delivery was decided upon.

During induction of general anesthesia the patient vomited and excessive mucus in the pharynx and larynx was troublesome. Contraction of the bony pelvis was not apparent and the vertex was found at +1 station in the L. O. P. position. The cervix, which was 6 cm. dilated and effaced, was grasped with sponge forceps and Dührssen's incisions were made at locations corresponding to 10, 2 and 6 on the clock. The vertex was then manually rotated to the L. O. A. position and mid-forceps were applied. Delivery of a 5 pound, 6 ounce still-born fetus was accomplished with moderate traction. During repair of the cervical incisions, vaginal bleeding became profuse but manual removal of the placenta controlled bleeding. No extension of the cervical incisions was found. The patient was in shock, her blood pressure 80/50 and her pulse rate 140. Blood transfusion was administered by positive pressure. While awaiting more blood the cervical incisions and the episiotomy were repaired. During recovery from anesthesia the patient again vomited large amounts. Moderate vaginal bleeding recurred but was controlled by uterine massage.

The patient was again found to be in shock, and pulmonary edema was marked. Death occurred within the hour.

CASE X. A twenty-nine year old primigravida at term, short of stature and weighing 210 pounds, entered the hospital because of ruptured membranes. Her antepartum course had been normal. X-ray pelvimetry revealed no evidence of cephalopelvic disproportion. Contractions were irregular and slight. The cervix was not dilated and the presenting part was unengaged. The following day uterine contractions were still irregular and the vaginal findings were unchanged. Fifty hours after admission the contractions became stronger and the vertex descended to a +1 station and the cervix dilated to 5 cm. After six hours of good labor when the contractions again became irregular, glucose solution, morphine and scopolamine were administered. The following morning the patient was exhausted, uterine inertia was still present, the cervix 7 cm. dilated and the vertex at the spines in the L. O. T. position. Under general anesthesia Barton's forceps were applied, but no descent occurred with moderate traction so they were removed. Cesarean section seemed indicated. However, an associate who was called in consultation found a contraction ring which he thought accounted for the dystocia and believed the patient should be delivered from below. One cubic centimeter of adrenalin was administered, anesthesia deepened and Kielland's forceps were applied. Dührssen's incisions were made laterally in the cervix and after considerable difficulty an 8 pound, 10 ounce stillborn fetus was delivered. Uterovaginal exploration revealed marked lacerations of the vagina but no extension of the cervical incisions. The placenta was expressed intact. During repair of the lacerations and incisions the patient went into shock. Blood loss was estimated at about 600 cc. Blood transfusion was begun but the patient died before it was completed. Postmortem exploration of the uterus revealed no evidence of rupture.

Questions. (1) When are Dührssen's incisions indicated? (2) How might they have been avoided in these cases? (3) What is cervical dystocia? (4) Is the diagnosis of contraction ring difficult? (5) What is its treatment when diagnosed? (6) What are

the complications resulting from Dührssen's incisions?

Answers. Dührssen's incisions, although a time-tested and obstetrically sound procedure, are now seldom resorted to as a solution of prolonged labor. Better management of uterine inertia and prevention of intrapartum infection have resulted in a marked decrease in the accepted indications for cervical incisions.

Cervical effacement must be complete, the vertex engaged and dilatation should be at least 6 cm. before delivery by this method may be considered. Fetal distress is rarely a valid indication. Cervical incisions and mid-forceps delivery will more likely than not add to fetal embarrassment. *It cannot be too strongly emphasized that meconium-stained fluid and changes in fetal heart rates from 100 to 180 may be present and yet there still may be no evidence of fetal distress at delivery.* Small babies which present as a footling breech will occasionally deliver through an incompletely dilated cervix as far as the head, which having the largest diameter cannot pass through the rigid cervix. Dührssen's incisions, although more difficult to perform, may be lifesaving for this baby.

Arrested labor in the primipara, with the vertex at or below the spines with the cervix effaced but not fully dilated, is still the most common indication for Dührssen's incisions. Almost without exception there has been early rupture of the membranes and labor has been complicated by uterine inertia.

Proper management of the first stage of labor in both of the foregoing cases might well have resulted in a happier outcome. The prolongation of labor with failure of complete cervical dilatation was the result of uterine inertia. The cervix did not dilate because the uterus did not contract in a manner which would produce complete retraction and dilatation. In normal labor the intensity of the uterine contractions increases from below upward to the fundus. They are regular in type and result in progressive cervical dilatation. With uterine inertia the contraction of the lower part of the uterus may equal or exceed the fundal contraction. These contractions are often irregular, very painful, and the cervical dilatation which results is very slow and incomplete. Although these cases are often diagnosed as cervical dystocia, the cervical findings are the result, not the cause, of the dystocia. A much better term is dysfunc-

tional labor. Cervical dystocia will not result from previous cauterization, lacerations, Dührsen's incisions or abnormal amounts of muscle or fibrous tissue. Previous partial amputation of the cervix with excessive scar tissue formation alone may produce cervical dystocia.

How then should the primipara who has ruptured membranes, an unengaged vertex and irregular contractions be managed? First and most important is vaginal examination (1) to discover if the membranes are ruptured, as the history is often unreliable, (2) to estimate the ripeness and dilatation of the cervix and (3) to make a clinical appraisal of the pelvis by palpation. X-ray examination, although not essential, may be helpful in diagnosis of an occasional brow presentation and in the determination of the type and measurements of the pelvis. If the cervix is not ripe and there is no evidence of cephalopelvic disproportion, antibiotics should be administered and the onset of labor awaited. Pituitrin stimulation is contraindicated in the presence of an unripe cervix. If contractions occur, a sedative should be given with the expectation that the contractions are due to false labor. If the cervix is found to be ripe and contractions continue to be irregular, intravenous pituitrin drip 1:500 at the rate of 30 drops per minute should be begun. The necessity for careful observation has been sufficiently stressed. In cases of true uterine inertia it may be necessary to continue the pituitrin throughout the first and second stages of labor. Needless to say fluid balance should be maintained and acidosis controlled so far as possible. One hundred cubic centimeters of blood are cross-matched in anticipation of third stage inertia and general anesthesia is avoided. With this management of uterine inertia, the need for cervical incisions will rarely arise. If labor does not progress satisfactorily, cesarean section may be performed at a time when the patient is still a good operative risk.

It is interesting to note the different methods elected for delivery following incision of the cervix—manual rotation and classical forceps application in the first case, and Barton's and Kielland's forceps in the second. There is no unanimity of opinion as to the procedure of choice. Excellent obstetricians have and will continue to favor different technics with seemingly equally good results. That their results might be better with occasional varia-

tions in technic is conjectural but certainly possible.

Analytic statistical surveys do not help us to determine the procedure of choice. Many intangible factors play a part, namely, the dexterity of the individual operator, structural variations of the pelvis, size and malleability of the fetal head and even accurate estimations of the stations of the head. Experience has taught us that the great majority of persistent posterior and transverse arrests may be successfully delivered by any one of several different procedures if the operator is able to carry it out properly. No method will be easy or safe if even borderline cephalopelvic disproportion exists; nor is mid-forceps ever easy with the vertex at, or just below, the spines. Cesarean section is often a wiser choice. Greatest difficulty is likely to be encountered when the sacrum is flattened and/or the promontory of the sacrum juts forward. Persistence in the use of Kielland's forceps in this type of pelvis will result in extensive vaginal laceration as in the last case. Manual rotation, too, is made difficult by a prominent promontory of the sacrum. Traction downward with rotation at a lower plane may be the only feasible method for delivery. The fetal risk increases with this method of delivery.

Contraction ring is usually neither suspected nor diagnosed until attempts at delivery fail, as in Case x. Rarely in cases of neglected labor, the diagnosis may be made by inspection of the abdominal wall. That contraction ring is present more often than we suspect seems likely, especially when membranes have been ruptured for some time and delivery is difficult.

Treatment of this formidable complication of labor is unsatisfactory. Sedation will have no direct effect upon the ring although it may give the mother a much needed rest. Adrenalin has been worthless in our hands and is dangerous in 1 cc. doses. Deep general anesthesia may be necessary despite the dangers of fetal anoxia and postpartum hemorrhage. Cesarean section is the lesser of two evils.

The complications which result from Dührsen's incisions are relatively few. Extension may occur but is not likely. Bleeding from the incisions is uncommon; and if proper assistance and retraction has been provided for, suturing of the incisions is not difficult. Laceration of the uterine artery, although often mentioned as most to be feared, should not occur if

cervical effacement has been complete. The difficulties associated with Dührssen's incisions are secondary to the complications which necessitated the operative interference. These are hemorrhage, shock, and to a much lesser degree, infection. Uterine inertia prior to delivery begets uterine relaxation and hemorrhage during the third stage of labor. This must

always be anticipated and provided for. Clinical experience has shown that long labor conditions the patient for shock. The fatigued and fearful patient withstands trauma and blood loss poorly. Antibiotics are indicated in the early postpartum period as well as during labor as intrauterine infection is often present even though maternal temperature is normal.



Announcement: The entire series of fourteen Obstetric Clinics will be available in a complete reprint which can be obtained from the publisher.