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Fetal therapy has been done for years, beginning with intrauterine transfusion in cases of fetal anemia secondary to maternal alloimmunization against Rh+ fetal red blood cells, and placement of catheters to decompress hydronephrosis from bladder outlet obstruction. More extensive surgical repair of congenital defects including meningomyelocele and diaphragmatic hernia, while not routine is performed at several centers. Ex utero intrapartum therapy (EXIT) procedure is almost becoming a matter of routine.

The EXIT procedure provides time on uteroplacental gas exchange to perform procedures such as direct laryngoscopy, bronchoscopy, tracheostomy, arterial and venous access, resection of an oral, neck or lung masses, and ECMO cannulation. The most common situation at Texas Children's Hospital, employing the EXIT procedure is that of a oral or neck mass, detected on prenatal ultrasound, that would make maintenance of the airway and/or endotracheal intubation at the time of delivery very difficult. Conversion of an emergency crisis into a controlled situation is possible through a multidisciplinary team approach.

Elective c-section delivery of the fetal head and thorax, allows for adequate evaluation of the airway and endotracheal intubation or tracheostomy while oxygen supply to the infant is maintained through the placenta. Once the airway is secured, delivery of the infant is completed. Critical to this is the maintenance of the fetal-placental circulation through uterine tocolysis. Texas Children's Hospital has currently performed several of this type of procedure.

A more complicated procedure is the performance of surgery on an immature fetus with plans to correct the problem, replace the fetus in the uterus, allow the fetus to reach maturity, then delivery by c-section. This paper describes the first successful procedure.

The 20 week fetus, of a 28 year old G2P,1 was noted on a routine prenatal ultrasound to have a uniformly echogenic 5 cm left sided lung mass, with eventration of the left hemidiaphragm but no effusions. Fetal MRI was performed and showed vascularity from the pulmonary artery and venous return to the heart. Over the next 2 weeks the fetus developed ascites, pericardial effusion and right-sided cardiac dysfunction. At 22 2/7 weeks gestation, fetal surgery was performed. The placenta was posterior. A transverse hysterotomy was done with multiple staples used to pex the membranes to the myometrium. The left arm and chest of the fetus was delivered through the incision. A pulse oximeter was placed on the fetal hand and was 67-74% throughout the procedure. The amniotic fluid was constantly replaced with warm saline. A left thoracotomy was performed at the 5th intercostal space with resection of the left upper lobe of the lung. A single episode of fetal bradycardia was treated with cardiac compressions and intracardiac atropine and epinephrine. A PRBC transfusion was given through the umbilical vein. The fetus was then replaced into the uterus. The uterus was carefully closed and observed for amnion leak.

Postoperative ultrasound revealed no resolution of the effusion or ascites, but correction of the cardiac axis and good heart function. A separation of the chorioamnion was noted on ultrasound, that became progressively less visible. At 32 weeks gestation preterm labor necessitated delivery by c-section. The male infant weighed 2105 grams (>75th%) with Apgar scores of 8 and 8. He was intubated for increased work of breathing, but on room air by day of life three. The chest was symmetric, the incision well healed and the only complication of the surgery was a fractured rib. He was discharged home on day of life 38.

The excised left upper lobe weighed 38 grams (expected total lung weight of 14 grams) and measured 6 x 5 x 2 cm. Rib markings were present on the pleural surface. The cut surface had a uniformly solid appearance and branching vessels and airways throughout. The histologic appearance was of a fetal cystic lung malformation composed of immature, maldeveloped lung with mildly enlarged airspaces lined by cuboidal epithelium and focal microcystic maldevelopment. The interstitium was widened by loose mesenchymal cells.

A complication of fetal surgery is oligohydramnios, in many cases thought to be due to leakage at the incision. This case demonstrated separation of the amnion and chorion, which would result in exposure of the chorionic surface to the amniotic fluid. The chorion is very porous and the low amniotic fluid index may be a feature of fluid reabsorption across the chorionic plate and not a leak. This theory is based on the knowledge that amnion rupture sequence is associated with oligohydramnios, at least in part due to reabsorption across the exposed chorionic plate. This case illustrates a possible etiology for oligohydramnios after fetal surgery. There is potential risk for the late development of "amniotic bands", which is known to occur rarely after amniocentesis and has potential for fetal disruptions or amputations. This report describes the prenatal diagnosis, surgical procedure, pathologic findings of both the lung lesion

and the placenta. This case also demonstrates the use of new technology and the successful outcome in an otherwise lethal condition.

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