

HEALTH & SCIENCE

Advances in Fetal Surgery



An Abstract authored by Denise Araujo Lapa Pedreira entitled “Advances in fetal surgery” appeared in the Jan/Mar 2016 issue of *Einstein* (São Paulo) vol. 14 no.1. Her purpose was to discuss “the main advances in fetal surgical therapy aiming to inform health care professionals about the state-of-the-art techniques and future challenges in this field.” She discusses “the necessary steps of technical evolution from the initial open fetal surgery approach until the development of minimally invasive techniques of fetal endoscopic surgery (fetoscopy).” The author notes that currently the following “fetal malformations can be treated with fetal surgery...monochorionic twin gestation complications (twin transfusion syndrome, acardiac twin, isolated intrauterine growth restriction, etc.), congenital diaphragmatic hernia (an intratracheal balloon is placed using fetal bronchoscopy), constrictive amniotic bands, lower urinary tract obstruction and, more recently, myelomeningocele” (the most serious form of spina bifida).

“Fetal surgery began in the 1980s via open surgery (maternal laparotomy, followed by hysterectomy with direct exposure of the fetus) and was gradually replaced by a less invasive surgical technique named fetoscopy, where ultrasound guides the entrance of a video camera inside the uterus. In the beginning, fetoscopy was carried out only in amniotic fluid medium, using a single port to access the uterine cavity and using an endoscopic scope with a working channel where a laser fiber can be fitted for the coagulation of blood vessels, where micro catheters go through for the balloon insertion, as well as, small bipolar forceps.”

The author notes that the “fluid medium poses limitations for more complex surgeries that require dissection and suture. Images acquired in fluid medium have lower quality than in the aerial medium, and if bleeding occurs, the hemorrhagic fluid does not allow an adequate imaging”. This can result in the procedure not being completed. Also, movement of the fetus from an “ideal position” can limit the ability to complete the procedure. The author stated that “to perform fetoscopy in the aerial medium became crucial to the advances in fetal surgery.”

In 2011, the Management of Myelomeningocele Study (MOMS) used open surgery for fetal repair. Drs. Adzick et al concluded that “prenatal surgery for myelomeningocele reduced the need for shunting and improved motor outcomes at 30 months, but was associated with maternal and fetal risks” (increased risk of preterm delivery, uterine dehiscence (rupture), need for blood transfusions, pulmonary edema). Pedreira

notes that “after a c-section, hysterorrhaphy can heal without tension, because the baby is already out, while in the open surgery, the fetus remains and continues to grow – therefore the hysterorrhaphy remains under constant and progressive tension.”

Pedreira noted that “despite these risks, open fetal surgery became the gold standard to treat myelomeningocele”. The search for minimally invasive techniques that would increase maternal safety continued. In 2014, T. Kohl at the German Center for Fetal Surgery and Minimally Invasive Therapy reported that a study which included 51 human fetuses employing “percutaneous (through the skin) minimal-access fetoscopic closure of spina bifida aperta (SBA)” resulted in “a high rate of technical success, regardless of placental or fetal position.” All fetuses survived the surgery. One very early preterm delivery a week after surgery resulted in immediate death. Another died from “an unsuspected case of trisomy 13, and there were two infant deaths from Chiari-II malformation.” (*Ultrasound Obstet Gynecol*, 2014 Nov)

Pedreira stated that Kohl et al in Germany and her group in Brazil were the only groups (at the time of publication in 2016) that were pursuing “an entirely percutaneous endoscopic approach for the prenatal treatment of myelomeningocele...Both groups use fetoscopy with partial carbon dioxide insufflation, but different surgical techniques for the repair itself.” She notes that just as in the “transition between performing surgery using laparotomy to using the laparoscopic approach, it was necessary to develop new surgical techniques, new instruments, trocars access, closure devices, etc.” She notes that “the German technique has achieved neurological developmental results that are quite similar to the results of the MOMS study, but with minimal maternal morbidity. The Brazilian technique, (SAFER – Skin-over-biocellulose for Antenatal Fetoscopic Repair) has obtained superior neurologic results compared to the MOMS study.” However, she warns that the results are preliminary (23 cases so far). In addition, “because three ports are needed to access the uterine cavity, the mean gestational age of delivery is slightly inferior, and the premature rupture of membrane rate is superior [to] the results of the MOMS study.”

Pedreira concluded, “We believe that further technical development in the near future will confirm if this new technique is not only SAFER to the mother, but also better [for] the fetus.”

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