

Instruments for Fetal and Neonatal Surgery

TECHNICAL FIELD

Medical Device: Fetal surgery (2007-0405; 2007-0504)

BACKGROUND

There are an increasing number of fetal surgeries being performed to help correct developmental disorders with high mortality rates if intervention is delayed until birth. The National Institute of Child Health and Human Development (NICHD) has established the Maternal Fetal Medicine Unit (MFMU) to support research into the physiologic, metabolic, endocrinologic, and pharmacologic events related to abnormal development of the fetus. Further highlighting the importance of caring for the fetus *in utero*, many children's hospitals in the U.S. have centers that deal specifically with conditions related to the fetus.

In order to make fetal surgical intervention possible, all instruments used for traditional surgeries must be modified to suit this particularly delicate application. The described inventions introduce methods for monitoring fetal oxygen levels and providing therapeutics directly to the fetus.



APPLICATIONS

1. Fetal surgery
2. Surgery in premature neonates

ADVANTAGES

- Instrument size ideal for use in a fetus or premature neonate
- Provides a method for direct access to fetus for therapeutic interventions

INVESTIGATOR

Pirooz Eghtesady, MD
Cardiothoracic surgery
Cincinnati Children's Hospital Medical Center

STATUS

Patent applications pending.

CONTACT

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TECHNOLOGY

Fetal pulse oximeter (2007-0504): The fetal pulse oximeter provides a noninvasive method for continuously monitoring the changes in fetal blood oxygen levels during surgery and/or therapeutic interventions. By placing the monitor on the uterine wall of the mother, it is possible to accurately measure the real-time blood oxygen level of a fetus, providing results very similar to invasive blood draws.

Fetal catheter (2007-0405): The fetal catheter is designed to be inserted through maternal tissue and guided by ultrasound into the fetal space, either into the amniotic fluid or through venous cord access. The catheter could then be used to chronically or semi-chronically administer necessary therapeutics via passage through the catheter directly to the fetus.

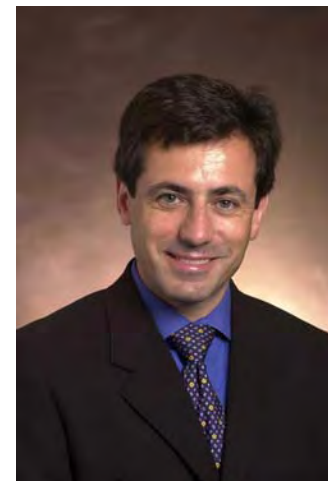
Instruments for Fetal and Neonatal Surgery

THE INVENTOR

Pirooz Eghtesady, MD, Ph.D.
Surgical Director, Pediatric Cardiac Transplantation
Division of Pediatric Cardiothoracic Surgery

BACKGROUND

Minor, Physics: California State University, Fresno (1981-83)
BS / MS: Biochemistry, UCLA (1983-87)
MD / PhD: Molecular Biology and Immunology, UCLA School of Medicine (1987-93)
Residency: Stanford University Hospital, Resident in General Surgery (1993-98)
Residency: Johns Hopkins Hospital, Resident in Cardiothoracic Surgery (1998-2001)
Fellowship: Broussais Hospital, Paris, France, Professor Alain Carpentier's Service, Fellow in Cardiovascular Surgery (1999)
Fellowship: Marie Lannelongue Hospital, Paris, France, Professor Claude Planche's Service, Fellow in Pediatric Cardiac Surgery (1999)
Fellowship: UCSF / Stanford University Hospital, Fellow in Pediatric Cardiac Surgery (2001-02)



Dr. Eghtesady takes a multidisciplinary approach to his research efforts, which include collaborations with the clinical efforts of the Fetal Care Center and Fetal Cardiology Program and Cincinnati Children's Hospital Medical Center. Together with his collaborators, Dr. Eghtesady is interested in developing clinically useful tools and protocols for maternal-fetal cardiac intervention and surgery. To aid in this work, ovine fetal models of various congenital heart diseases have been developed and studied.

The laboratory's research emphasis is primarily on fetal aortic stenosis and Hypoplastic Left Heart Syndrome (HLHS). Studies are also underway to better understand potential etiologic mechanisms in fetal defects. In addition, the lab is studying the potential utility of natriuretic peptides as biomarkers of fetal cardiovascular well-being and as a candidate selection marker for fetal cardiac intervention. Most recently, the focus has been on the potential role of maternal strep exposure in pathogenesis of HLHS.

In addition to the basic laboratory research, Dr. Eghtesady is also involved in several clinical research projects, including a multi-institutional NIH-sponsored project conducted by the Pediatric Heart Network, studying the optimal surgical therapy for newborns affected by HLHS.

Recent Publications

Lam CT, Sharma S, Baker RS, Hilshorst J, Lombardi J, Clark KE, **Eghtesady P.** *Fetal Stress Response to Fetal Cardiac Surgery.* Annals of Thoracic Surgery. 2008 May; 85(5): A1-A70, e24-e-31, 1719-27.

Ashcraft T, Jones K, Border W, **Eghtesady P,** Pearl J, Khoury P, Manning PB. *Factors Affecting Long Term Risk of Aortic Arch Re-Coarctation Following the Norwood Operation.* Annals of Thoracic Surgery. 85(4); 1397-1402.

Baker RS, Lam CT, Heeb EA, Hilshorst JL, Ferguson RE, Lombardi J, **Eghtesady P.** *A Simple Solution is "Prime" for Fetal Cardiopulmonary Bypass.* ASAIO J. 2007 November/December; 53(6):710-715.