

Fetal Therapy

Second Edition

Fetal Therapy

Scientific Basis and Critical Appraisal of Clinical Benefits

Second Edition

Edited by

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every effort has been made to disguise the identities of the individuals involved.
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provided by the manufacturer of any drugs or equipment that they plan to use.

To the patients and families who entrust us with their most precious possession, their developing child, and those who have been our teachers and mentors over the years. A special thank you to each of our families for their support, tolerance, and understanding.

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Foreword

The dawn of fetal therapy occurred over five decades ago. Sir William Liley pioneered the first successful fetal therapy when he transfused donor red blood cells into the peritoneal cavity of an anemic fetus in a pregnant woman with Rh(D) alloimmunization. What is most remarkable is that this procedure was accomplished before the introduction of obstetrical ultrasound. Liley used radiopaque dye injected into the amniotic cavity to outline the fetus as an *amniogram* in order to target the fetal peritoneal cavity. Since these early days, remarkable progress has been achieved in the areas of fetal diagnosis and therapy. With ultrasound, using increasingly sophisticated technology, becoming part of routine obstetrical practice most fetal structural anomalies are easily diagnosed. Rapid acquisition, high resolution magnetic resonance imaging has further refined these diagnoses. Chromosomal microarray and whole exome sequencing have led to new diagnostic capabilities. Invasive procedures to acquire chorionic villi or amniotic fluid are rapidly being replaced by analyzing free fetal DNA in the maternal circulation.

These tools have led to a rapid evolution in fetal therapy. Early attempts to correct major congenital anomalies such as lower urinary tract obstruction, diaphragm hernia and sacrococcygeal teratoma were attempted by the pediatric surgical community through open hysterotomy. Premature delivery or fetal demise was often the result, leading many to question the future of fetal therapy for structural anomalies. A renewed interest in fetoscopy, once used primarily as a diagnostic tool, occurred when laser photocoagulation of placental anastomoses proved successful in the treatment of severe twin-twin transfusion syndrome (TTTS). Open hysterotomy returned to the spotlight with interest in correcting fetal myelomeningocele (MMC) – the first non-lethal congenital condition where fetal therapy attempted to improve lifelong morbidity instead of perinatal mortality.

A notable shift in the mindset of fetal therapy has occurred in the last decade. New therapies are no longer accepted as

the standard of care after a period of simple innovation. Randomized clinical trials for laser therapy for TTTS and fetal MMC repair have proven these therapies to be scientifically sound. Tracheal occlusion for the treatment of fetal diaphragm hernia is currently being evaluated in such a trial. Multicenter alliances such as the EUROFOETUS group and the North American Fetal Treatment Network have been established to further research collaboration.

This second edition of *Fetal Therapy: Scientific Basis and Critical Appraisal of Clinical Benefits* builds on this new paradigm of an evidence-based approach to therapeutic maneuvers to aid the unborn patient. The editors have assembled a renowned group of international experts in their respective fields. Many aspects of fetal therapy that have evolved since the publication of the first edition are now addressed in this updated version. Notably a new section on the pathophysiology and prevention of preterm birth has been added. Ongoing research and potential therapies to ameliorate neurologic sequelae in cases of severe growth restriction, congenital heart disease, TTTS and the premature infant in general are included in new chapters. Evolving therapies such as the artificial womb, fetoscopic repair of fetal MMC, and the use of stem cells to address the issue of premature rupture of the membranes after fetoscopy are included in this edition.

This text deserves a prominent place in the library of any provider of fetal medicine. Its owner will be well served with a contemporary and authoritative reference on the care of the unborn patient with complex issues.

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