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Edited by Olutoyin A. Olutoye  
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# Anesthesia for Maternal-Fetal Surgery

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Concepts and Clinical Practice

Edited by

**Olutoyin A. Olutoye**

Texas Children's Hospital Baylor College of Medicine Houston, TX



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Dedicated to:

- *God Almighty,*
- *My dear late mother, Egun,*
- *The brave women who give of themselves for the betterment of their fetuses.*

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## Abbreviations

AA	arterioarterial
AAPSS	American Academy of Pediatrics Surgical Section
ACLS	advanced cardiac life support
AFS	antenatal fetal surveillance
AFV	amniotic fluid volume
AO	ascending aorta
APN	Advanced Practice Nurse
AREDF	absent or reversed end diastolic flow
AV	arteriovenous
BA	bronchial atresia
BC	bronchogenic cyst
BPP	biophysical profile
BPS	bronchopulmonary sequestration
CCA	common carotid artery
CCAM	congenital cystic adenomatoid malformation
CCO	combined cardiac output
CCHD	critical congenital heart disease
CDH	congenital diaphragmatic hernia
CHAOS	congenital high airway obstruction syndrome
CHD	congenital heart disease
CLE	congenital lobar emphysema
CPAM	congenital pulmonary airway malformations
CPR	cerebroplacental ratio
CSF	cerebrospinal fluid
CST	contraction stress test
CT	computed tomography
CVR	CCAM volume ratio
DA	ductus arteriosus
DV	ductus venosus
DVP	deepest vertical pocket
ECG	electrocardiogram
ECMO	extracorporeal membrane oxygenation
EFW	estimated fetal weight
eHLHS	evolving hypoplastic left heart syndrome
ELS	extralobar sequestration
ePPROM	early preterm premature rupture of membranes
EXIT	ex-utero intrapartum therapy
FBS	fetal blood sampling
FETO	fetal endoscopic tracheal occlusion
FEV1	one-second forced expiratory volume
FFP	fresh frozen plasma
FGR	fetal growth retardation
FHR	fetal heart rate
FO	foramen ovale
FOV	foramen ovale valve
FTB	Fetal Therapy Board
FTC	fetal therapy center
FTNC	Fetal Therapy Nurse Coordinator
FVC	forced vital capacity
hCG	human chorionic gonadotropin
HDFN	hemolytic disease of the fetus and newborn

## List of Abbreviations

HELLP	hemolysis, elevated platelets, low platelets
HFOV	high-frequency oscillation ventilation
HLHS	hypoplastic left heart syndrome
HPL	human placental lactogen
ILS	intrahepatic sequestrations
iNO	inhaled nitric oxide
IPT	intraperitoneal transfusion
IUT	intrauterine transfusion
IRB	investigational review board
IUGR	intrauterine growth restriction
IUT	intrauterine transfusion
IVC	inferior vena cava
LA	left atrium
L&D	labor and delivery
LHR	lung-to-head ratio
LHV	left hepatic vein
LUTO	lower urinary tract obstruction
LV	left ventricle
MAC	minimum alveolar concentration
MAC	minimal anesthetic concentration
MAP	mean arterial pressure
MBA	mainstem bronchial atresia
MCA-PSV	middle cerebral artery peak systolic velocity
MCDA	monochorionic and diamniotic
MFM	maternal-fetal medicine
MoM	multiples of the median
MMC	myelomeningocele
MRI	magnetic resonance imaging
NICU	neonatal intensive care unit
NRP	neonatal resuscitation program
NST	nonstress test
NT	nuchal transparency
NTD	neural tube defect
O/E-LHR	observed-to-expected lung-to-head ratio
O/E TFLV	observed-to-expected total fetal lung volume
OFS	open fetal surgery
OOPS	operation on placental support
OR	operating room
PA	pulmonary trunk
PA/IVS	pulmonary stenosis/atresia with intact ventricular septum
PCR	polymerase chain reaction
PI	pulsatility index
PRBC	packed red blood cells
PROM	premature rupture of membrane
RA	right atrium
RBC	red blood cell
RFA	radiofrequency ablation
RP	right portal branch
RV	right ventricle
SCD	sequential compression device
SCT	sacrocoxygeal teratoma
S/D ratio	systolic to diastolic ratio
SFLP	selective fetoscopic laser photocoagulation
SIVA	supplemented intravenous anesthesia
SVC	superior vena cava
SVR	systemic vascular resistance

## List of Abbreviations

TA	thoracoamniotic
TAPS	twin anemia polycythemia sequence
TEDI	tracheoesophageal displacement index
tPA	tissue plasminogen activator
TR	tricuspid regurgitation
TRAP	twin retrograde arterial perfusion syndrome
TTTS	twin to twin transfusion syndrome
UA	umbilical artery
UV	umbilical vein
VSD	ventriculoseptal defect
VTE	venous thromboembolism
VV	venoovenous

## Preface

This book provides education about different conditions in pregnancy that constitute a threat to fetal survival or postnatal morbidity and are amenable to repair in-utero. Advances in imaging have allowed for these conditions, and the associated pathophysiology, to be diagnosed early and/or monitored during prenatal care with an accompanying plan for fetal surgical management. This book, contributed to by diverse experts in maternal-fetal care from a variety of fetal programs, provides foundational knowledge to aid anesthetic management for these procedures. Specific nuances for the peri-operative anesthetic care of both the mother and the fetus in this period, and the close multidisciplinary collaboration required, are all discussed in this book. The initial chapters on physiology of pregnancy, fetal physiology and ethics of fetal surgery, are followed by chapters pairing the discussion of a fetal anomaly and its perinatal management with the anesthetic considerations for that particular condition. This material is uniquely crafted for the anesthesia providers, surgeons, obstetricians, pediatricians, nurses and trainees who care for patients who have, or will undergo, fetal surgery.

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