Contents

Chapter 1 Introduction to Antepartum Fetal Surveillance 1

Antepartum Fetal Surveillance Involves Use of Various Techniques 1
Indications for Antenatal Fetal Assessment 1
Indications 1
Fetal Body Movement Monitoring 2
Monitoring Techniques 2
Diurnal Variation 3
Decreased Fetal Activity 3
Excess Fetal Activity 3
Association of FHR and FM 4
Association of FM/FHR/Acoustic Stimulation 4
Labor 4; Effect of Medication 4
Clinical Application 4
Stillbirth 4; Hypertension 5; Congenital Malformations 5
Twins 5; Diabetes 5; Fetal Growth Retardation 6
Postdate Pregnancies 6; Rh Isoimmunization 6
Biochemical Assessment of Fetal Well-being 6
Important Biochemical Markers for Antenatal Fetal Surveillance 7
Estrogen-Estriol 7

Chapter 2 Nonstress Test 9

Neurological Paths that Trigger Accelerations 9
Protocol for NST 9; Interpretation 9; Reading an NST 10
Causes of Decreased Variability 10; Causes of Tachycardia 11
Bradycardia 11; FIGO Classification 11
Decelerations 12
Baseline Variability 13; Decelerations 13
NST Scheme 15

Chapter 3 Contraction Stress Test 16

Pathophysiology 16
Procedure 17
Interpretation 17
When to do the test? 17; CTG in Breech 18

Biophysical Profile 18
Manning and SIPOS 18; Vintzileos 18; Score 19
Pathophysiology 19; Advantages 19; Disadvantages 20
Indications 20; Contraindications 21;
When to Begin Testing? 21; Interpretation 22
Reversible Causes of an Abnormal CST 23
Admission Test (AT) 23
Planning Management 23; How Long Should a CTG Last? 23
Intrapartum Cardiotocography (Fetal Surveillance During Labor) 24
Fetal Metabolic Acidosis—Prevalence and Significance (Causes of Asphyxial Brain Damage) 24
External (Indirect) Activity Monitoring 25
Electronic Fetal Heart Monitoring 25
Defining the intrapartum CTG 25

Chapter 4 FAST (Fetal Acoustic Stimulation Test) and VAST (Vibroacoustic Stimulation Test) 27

Fetal Acoustic Stimulation Test (FAST) 27
Vibroacoustic Stimulation Test (VAST) 27
Clinical Aspects of VAST 27
VAST: In Fetal Admission Test 28
Habituation 28
Safety 28

Chapter 5 Biophysical Profile 29

Historical Events 29
Biophysical Profile 29
Variables 29
Two Scoring Systems 30
While Performing BPP Test 30
Modified Biophysical Profile 31
Campbell's BPP Scoring Criteria 32
Nonstress Test 32; Fetal Movements 32; Fetal Breathing Movements 33; Fetal Tone 33; Amniotic Fluid Volume 33
Placental Grading 33
Basic Physiology and Pathophysiology of BPP Component 33
Observation by Vintzileos et al 34
Relationship Between Biophysical Activity and Umbilical Venous pH in Fetus before Labor 34
Management Protocol 34
Advantages of BPP 34
Pitfalls of BPP 35

Chapter 6 Amniotic Fluid Assessment 36

Formation of Amniotic Fluid 36
Amniotic Fluid Volume According to Gestational Age 37
Amniotic Fluid Volume 38
Estimation of Amniotic Fluid Volume 38
Methods of Assessment with the Use of USG 38
Subjective Method 38; Maximum Vertical Pocket 39
Amniotic Fluid Index (AFI) 39
AFI and MVP 40
Amniotic Fluid Index Measurement Technique 40
Indications of AFI Testing 40
Routine USG Examination at 16 Weeks 40
During the Antepartum Testing 40
Monitoring of Patients with Preterm PROM 41
Frequency of Amniotic Fluid Volume Assessment 41
Drawback of AFI Estimation 41
Oligohydramnios 41
Conditions Associated with Oligohydramnios 41
Polyhydramnios 42
Meconium Staining of Amniotic Fluid 42; Passage of Meconium 42; Adult 42; Involuntary Defecation 43

Chapter 7 Ultrasound Markers of Chromosomal Anomalies in First Trimester 44

Nuchal Translucency (NT) 44
Absent Nasal Bone 45
Examination of Nasal Bone (FMF Guidelines) 46
Other Ultrasound Markers 46
Structural Anomalies 47; Doppler Studies 49

Chapter 8 Second Trimester Scan 51

Head 51
How to Examine 51
Face and Neck 55
How to Examine? 55
Spine 55
Thoracic Cavity 57
Heart 58
Parameters to Note 58
Abdomen 60
Genitourinary System 61
Common Abnormalities 62
Extremities 63

Fingers 64; Feet 64
Umbilical Cord 64
Placenta 67
Amniotic Fluid 69
Cervix 69
How to Optimize the Result 69

Chapter 9 Role of Color Doppler in the Management of High-Risk Pregnancy 72

Definition 72
Etiology 72
Fetal Growth Rates 73
Pathophysiology 73
Diagnosis of Fetal Growth Restriction 74
Diagnosis of Fetal Compromise or Jeopardy 75
Tests for Fetal Well-being 79; Indications of Fetal Well-being Studies 80; Sequential Changes in Tests for Fetal Well-being 80 Detection of Fetal Growth Restriction (FGR) and Intrauterine Growth Restriction (IUGR) 81; Fetal Oxygenation 83 Hypoxemia 83; Hypoxia 83; Asphyxia or Acidosis 84

Chapter 10 3D and 4D US for Fetal Well-being 86

First Trimester 86; Nuchal Translucency Scan 86 Nasal Bone 87; Facial Abnormalities 89; Micrognathia 91 Ear Abnormalities 91; Cranial Abnormalities 92 Central Nervous System 93; Spinal Abnormalities 98 Chest 98; Abdomen 100; Limb Abnormalities 101 Placenta 101; 3D–4D US for Fetal Echocardiography 103 Limitations of 3D–4D US 103

Chapter 11 Biochemical Markers 107

Second Trimester (15–20 Weeks) 107
Alpha-Fetoprotein (AFP) 107; Human Chorionic Gonadotropin (hCG) 109; Estriol 109; Inhibin-A 109
First Trimester (9–14 Weeks) 109
Free Beta hCG 109; Pregnancy-associated Plasma Protein-A (PAPP-A) 109

Chapter 12 Fetal Maturity Testing 110

Appropriate Specimen for Fetal Lung Maturity Determinations 112; Lecithin-Sphingomyelin Ratio 112; Phosphatidylglycerol (PG) 113; Foam Stability Index 113 Lamellar Body Counts 114; Fluorescent Polarization Test (FLM) 114

Chapter 13 Invasive Diagnostic Tests for Prenatal Diagnosis 116

Methods of Prenatal Screening and Diagnosis 116
Amniocentesis 118
Chorionic Villus Sampling (CVS) 119
Maternal Blood Sampling for Fetal Blood Cells 120

Chapter 14 Fetal MRI 122

Indications 122
Brain and Spine 122; Skull, Face and Neck 123
Thorax 123; Abdominal, Retroperitoneal and Pelvic 124
Risks of fetal MRI 124
Benefits of Fetal MRI 124

Chapter 15 Future in Antepartum Fetal Surveillance 127

New Monitors which are Being Made Available in UK and USA 128
Passive Fetal Heart Monitoring System 128
Maternal-Fetal Monitoring System 128

Chapter 16 Normal Values and Charts in Pregnancy 130

Bibliography 139
Index 141

Abbreviations

NST	—	Nonstress Test
CST	—	Contraction Stress Test
BPP	—	Biophysical Profile
MRI	—	Magentic Resonance Imaging
FHR	—	Fetal Heart Rate
FM	—	Fetal Movements
HTN/HT	—	Hypertension
IUGR	—	Intrauterine Growth Retardation
EFM	—	Electronic Fetal Movement
AFI	—	Amniotic Fluid Index
AF	—	Amniotic Fluid
AFV	—	Amniotic Fluid Volume
MCA	—	Middle Cerebral Artery
UA	—	Umbilical Artery
AEDF	—	Absent End Diastolic Flow
REDF	—	Reduced End Diastolic Flow
L/S	—	Lecithin–Sphingomyelin Ratio
HPL	—	Human Placental Lactogen
APH	—	Antepartum Hemorrhage
BP	—	Blood Pressure
IUD	—	Intrauterine Demise
GA	—	Gestational Age
USG	—	Ultrasonoegraphy
MRI	—	Magnetic Resonance Imaging