FETAL AND NEONATAL BRAIN INJURY

Now in its third edition, this is a comprehensive survey of fetal and neonatal brain injury arising from hypoxia, ischemia, or other causes. The publication spans a broad range of areas from epidemiology and pathogenesis, through to clinical manifestations and obstetric care, and then on to diagnosis, long-term outcomes, and medicolegal aspects. An important theme running throughout is to highlight scientific and clinical advances that have a role to play in minimizing risk, improving clinical care and outcomes. The text describes how placental abnormalities, imaging studies, and laboratory measurements can identify the timing and severity of the injury event. Despite these advances, fetal and neonatal brain injury remains a major concern with devastating consequences. It is hoped that this definitive account will provide the clinician not only with a better understanding of the mechanisms involved but also with the best available knowledge necessary to deal with this intractable problem.

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FETAL AND NEONATAL BRAIN INJURY

Mechanisms, Management, and the Risks of Practice

THIRD EDITION

Edited by
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Foreword by Avroy A. Fanaroff

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Foreword

Great strides have been taken in the relatively new specialty of neonatal–perinatal Medicine. The evidence upon which neonatal–perinatal medicine is practiced has expanded considerably and the rationale for many interventions is now supported by scientific data. Application of the biochemical and technologic advances to obstetrics and neonatology has improved the immediate and long-term outlook for the majority of neonates. Inspection of the major causes of neonatal mortality reveals that birth defects now head the list and there has been a sharp decline in death from respiratory disorders and immaturity. However, injury to the central nervous system continues to be a major concern. After an apparently normal pregnancy only a brief period of oxygen deprivation or exposure to other noxious stimuli may cause devastating and permanent injury to the central nervous system. Haldane is attributed to have said that “Hypoxia not only stops the motor, but also destroys the machinery.” Hypoxia can definitely destroy the developing brain.

This edition of Fetal and Neonatal Brain Injury is very timely and not only provides comprehensive coverage of the emerging issues and clinical trials in progress but also provides state-of-the-art deliberations on neuroimaging in addition to the infectious and metabolic encephalopathies.

Stevenson, Benitz, and Sunshine have assembled an outstanding group of contributors to tackle comprehensively the accumulating evidence on fetal and neonatal brain injury. No topic worthy of discussion on the developing brain has been omitted and the expert contributors have uniformly excelled.
in their assigned tasks, providing in depth commentaries and facts in an easy-to-read manner. This book is truly at the cutting edge and the hot topics have been appropriately highlighted, the established information well packaged, and a heroic effort made to cross-link the basic science with the bedside needs. Often neglected topics such as ethics and medicolegal issues are well represented side by side with sophisticated imaging, pathophysiology, and molecular biology.

There is a great deal of anticipation about the use of hypothermia for the treatment of hypoxic-ischemic encephalopathy. This therapy is being carefully evaluated. Regrettably, there is no way to shorten the interval between the intervention and primary outcome, which is long-term neurodevelopmental status. Furthermore these cases occur sporadically so that, despite the fact that there are multicenter – even multinational – trials, recruitment is proceeding slowly and we must patiently await the outcomes. Hopefully the trials have been sufficiently powered so that the results will be definitive.

Modern perinatal care, including fetal surveillance, antenatal administration of glucocorticoids, surfactant administration, and ventilatory assistance, has improved survival rates for very-low-birth-weight infants. There has however been no improvement in the neurodevelopmental outcomes of such infants and handicapping conditions are documented in 20–40%. Unraveling the relationship between chorioamnionitis, cytokines, and periventricular leukomalacia may shed light on this complex problem and provide some clues on when and how to intervene and prevent permanent injury. Perhaps further refinements in imaging and spectroscopy will clarify the sequencing and timing of insults to the brain. There is still much to be learned about the developing brain but the foundations have been expanded and the exponential rate of data acquisition is cause for optimism that solutions to preventing or correcting injuries to the brain will be on the radar screen within a reasonable time period.

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Preface

Injury to the fetal and neonatal brain continues to be a major risk in an era when perinatal care has improved significantly and neonatal survival rates have improved steadily. A great deal of emphasis has been placed on the understanding of the pathophysiological and biochemical alterations that occur during the asphyxial episode or episodes, and which continue through the resuscitative and reparative periods. Newer technologies and approaches to therapy have also been developed to maximize the chances of an optimal outcome for the affected patient. There has been a great deal of effort by the American Academy of Pediatrics and the American Heart Association to educate caretakers in order to improve the immediate and follow-up care of the neurologically depressed newborn who is in need of resuscitative management.

In this, the third edition of our text, we have incorporated many of the newer approaches to the understanding of the cellular and molecular bases of hypoxic–ischemic encephalopathy (HIE), as well as the newer approaches to the immediate and continuing care of these infants. We have added new chapters on obstetrical conditions that may be associated with brain injury of the fetus, including chorioamnionitis, various maternal diseases, and obstetrical catastrophes. Metabolic disorders that may have clinical manifestations that mimic HIE have been emphasized as well. The chapters on infectious diseases that can result in brain injury have been enhanced, with particular reference to viral and group B streptococcal infections. The long-term follow-up of the affected infants as well as the ethical
considerations involved in the approach to care have also been updated.

We have added a third editor, Dr William E. Benitz, in order to strengthen the recruitment of contributors and to “fine-tune” many of the presentations.

As noted in our previous editions, with any text that has multiple contributors there is a certain amount of overlap and repetition among the various presentations. Rather than editing these chapters to avoid such overlap entirely, we have elected to respect the authors’ unique presentations and styles, as different perspectives also reflect the richness of their clinical experiences. We also believe that this allows the contributors to express their opinions more freely, and the variation of opinion on similar topics can thus be appreciated.

We would like to take this opportunity to thank our collaborators, especially those who met their editorial deadlines and the members of Cambridge University Press for their support and expertise in preparing the text. Secretarial help from Jenni Edgar, Christy Stoffel, and Lani Lucente, who spent many hours in preparation of the manuscript, as well as Tonya Gonzales-Clenny, who edited many of the papers to fit the format of the text, is deeply appreciated.

We also wish to thank our respective wives, Joan Stevenson, Andrea Benitz, and Sara Sunshine for their support, encouragement, and patience.

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